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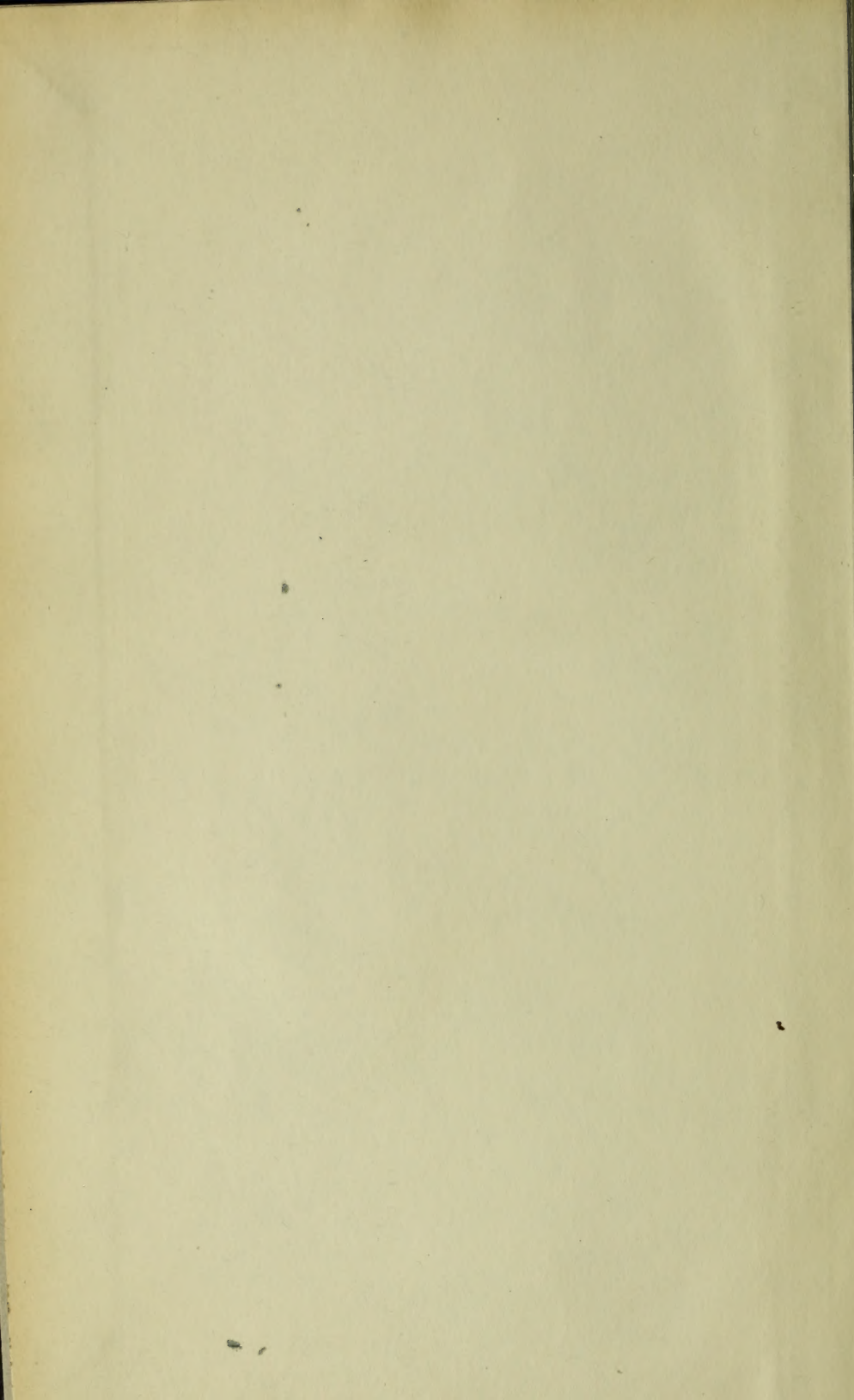
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The Commonwealth of Massachusetts

# ANNUAL REPORT

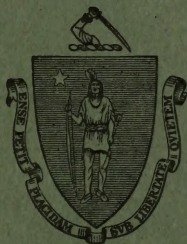
OF THE

## DIVISION OF FISHERIES AND GAME

FOR THE

YEAR ENDING NOVEMBER 30, 1920

DEPARTMENT OF CONSERVATION



BOSTON

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The Commonwealth of Massachusetts

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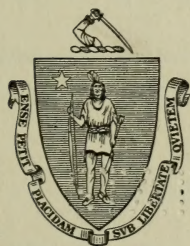
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FOR THE

YEAR ENDING NOVEMBER 30, 1920 - 1921.

Mass., DEPARTMENT OF CONSERVATION; Division of fisheries  
and game



Boston

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Commissioner.

WILLIAM A. L. BAZELEY.

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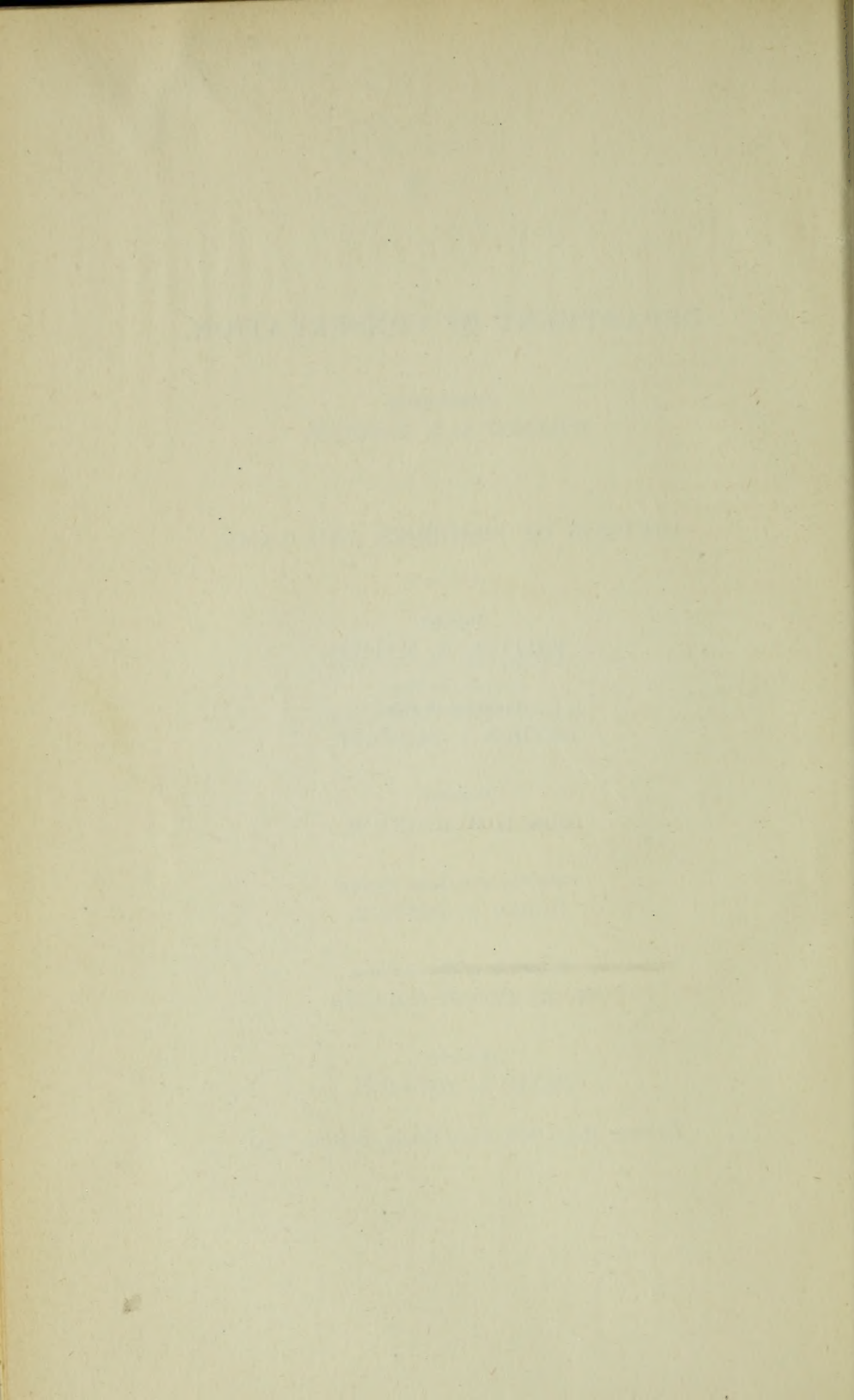
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## The Commonwealth of Massachusetts

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### GENERAL CONSIDERATIONS.

The greatest concern of those who are studying the relation between the wild life of any given State and the increasing drains on it, through the taking in each year, is the fact that there is probably no species of game bird or fish which is any more than holding its own. The annual production at the bird farms and fish hatcheries is not in proportion to the increasing number of sportsmen and fishermen who take the field, and very little or no margin is left for the inroads on the stock due to unfavorable breeding seasons, forest fires, cutting of the covers, severe winters and ravages of vermin. In fact, it is a common expression among the older and deeper observing men, "It is a mystery to me how the wild life holds its own under existing conditions."

All of this demands increasing search for any agencies which will assist in causing the balance to swing toward a gradual increase in the stock. Great emphasis has been placed on the artificial propagation of certain species of birds, quadrupeds and fish, — this is probably the greatest single factor. Then should follow the elimination of vermin, and the establishment of breeding and wintering grounds which are closed to all shooting throughout the year. The foregoing about exhausts what man can do, with the exception of the following proposition upon which particular emphasis should be laid. It is elementary that the largest amount of wild life will be found on the area (whether of land or water) that is most adapted to it, and where such conditions as food and protection (in its fullest sense) are present to the economic maximum. It is a fair assertion that there is no area of land or body of water in this Commonwealth to-day on which primeval conditions have been maintained or artificial conditions developed to the point where it can be said that that area is in such physical

condition that it will maintain indefinitely its full quota of wild life. If this is true of certain areas which have had special attention, then we are in a position to visualize what is the actual condition throughout the entire State, and how hopeless it is to expect great increases in the stock of wild life until conditions approximating the economic maximum can be created. The prospect for any general development along this line is exceedingly remote by reason of the very democracy under which we live.

In the old feudal days, had the owner of a large tract of land come to this conclusion, he could have immediately issued certain orders to all his tenants, demanding that they do certain things. For instance, he could have commanded them to build reservoirs in which the snows of the winter could be collected, and throughout the rest of the season gradually emptied, in order to keep the trout brooks on his domain full of the coldest water. He could have ordered them to deepen pools in various parts of the brooks and to plant, or permit to grow along the shores, vegetation which would protect the stock. At the headwaters of the tributary brooks conditions would have been made ideal for spawning fish, and for the eggs and fry to have adequate protection throughout and following the spawning season. Ponds and large lakes would have been suitably stocked with such vegetation, small forms of animal life and small species of fish as would provide the maximum food supply.

On the hills and in the valleys that vegetation which supplied the birds with their natural food would have been permitted to flourish, and wherever it had been destroyed it would have been replaced and extended, to the end that all the birds and animals which could economically live on that range would have adequate food supplies and protective covering. Realizing the extent to which his ancestors had unwittingly drained his domains of its wild life he would have delegated to certain tenants the work of artificially propagating those species which could be so handled, in order to hasten the return of desired conditions; and he would have completed the plan by issuing an order that a continuous warfare should be kept up against vermin, and that he and his followers

would be permitted to take only a portion of the annual increase for recreation and for food supply. Could the good baron live but a few years he could die in peace, knowing that he had restored to his children's children a domain on which they could enjoy once more the wild life which their ancestors squandered.

But the very democracy under which we live and to which we point with pride actually makes against any such practical handling of the problem. To-day each man owns his land in fee, and he is lord thereon. The State government has no control over it, as relating to the matters under discussion. The owner cuts his forest with no thought of the results to the State and the denuded hills precipitate the waters to the sea. As the streams dry up and the ponds and lakes are drawn on to turn the wheels of commerce, their receding waters leave the valuable food-bearing vegetation on the shores to wither and die. Every available area of land that will produce crops is put to the plow, and in the winter is a desert. The only cover left, as a rule, is that which is not suitable for exploitation, and the only food supply is that which can exist on these neglected areas. Vermin exists and takes at will except where reduced to some extent by trapping. But the trapper is not interested in the species most deadly to game, as, for example, the weasel; and man has supplemented the natural enemies by contributing the most deadly of all, — the unrestrained hunting house cat. The great horned owl and the goshawk ply their trade at will, and the water snake and the snapping turtle are unmolested. It is difficult to criticize the owner of the land, for by present-day standards he is justified in commercially exploiting his holdings to the limit. Unless he happens to be a fisherman and hunter or one particularly interested in birds, the preservation of the wild life means little to him, and he gives it no consideration.

The Federal government has gone a great way in assuming protection of the migratory birds. The State government has placed many wise restrictions on what its citizens may do in the taking of wild life. It has made very commendable efforts with its limited jurisdiction over the land within its boundaries. If the State did all that it possibly could do there



would still be this great underlying proposition over which it could exercise no control. The proposition stands thus, — the wild life must have the things previously enumerated. The State can supply only a portion. The individual landowners must do the rest. The owners are under no legal obligation to supply this "rest," and the only hope lies in educating them to this requirement. But even as to education there is little hope for progress when the things required mean the loss of dollars and cents to the owners of the land. On publicly owned lands the State government some day may establish ideal conditions, but this will take time and money. If we have been slow in acting as to the public domain where commercialism is removed, what can be expected of the individual where commercialism exists? And where a landowner or a group of landowners do the things that are necessary to restore wild life in substantial numbers, the growing tendency is for them to capitalize this condition by excluding the general public and leasing the sporting privileges.

No complete solution of this problem is at hand. The hope of the future lies in the increased financial assistance brought about by assuming a greater financial obligation in the shape of increased license fees by those who pursue and take the wild life; in the doing by the State of more of the things which it can do; in the education of the owners of the land to generously do more of the things which *they* can do, and which remain undone either through inadvertence or through the conflict with other commercial interests; and in the education of those who exploit these resources to greater restraint in the takings and to a willingness to make an individual contribution, financially or through personal service, in conjunction with the landowners, toward assisting in doing the things which only the landowner can do.

#### REORGANIZATION.

By chapter 350, General Acts of 1919, the Fish and Game Commission was incorporated into the Department of Conservation which was created by the said act.

Pursuant to the provisions of the act His Excellency on Nov. 24, 1919, nominated William C. Adams of Newtonville as



Director of the Division of Fisheries and Game, by which title the organization which succeeded the former commission was designated. The nomination was confirmed by the Council on Dec. 1, 1919, and on that date the board of three members previously having charge of fish and game matters ceased to exist, and the Division of Fisheries and Game came into being.

With the opening of the year and the organization of the Department of Conservation the year's work was immediately outlined. Conferences were held, called by the Commissioner of Conservation and the Director, with the hatchery superintendents, the wardens, the commercial fish interests and the sportsmen. The latter conference, held on Jan. 9, 1920, at the State House, was an innovation. For the first time in the administration of fish and game matters in Massachusetts representatives of all the sportsmen's associations and individuals from towns where no associations existed were called together to discuss the wild life situation.

#### SPORTSMEN'S CONFERENCE.

In opening the meeting the Commissioner of Conservation discussed the interrelation of the forestry work, over which he as State Forester has immediate control, with the wild life conditions under the charge of the Division of Fisheries and Game.

Consideration of the main subject of the meeting followed, namely, the wild life situation and the problem facing the Division. Even the sportsmen and fishermen who are most closely interested in fish and game problems have, nevertheless, in the past had slight conception of the condition of wild life over the State as a whole, the innumerable phases of the work of fish and game conservation, the volume of the work, and particularly the financial resources. This lack of comprehensive knowledge has been productive in many quarters of dissatisfaction with the results which the officials have been able to produce.

Director Adams outlined the Division's resources and the present status of wild life in the State, thus:—

In undertaking the administration of the Division of Fisheries and Game I feel that the public should have the facts which will enable it to visualize the proportions of the job, and to understand how far the

work can be carried on with the finances and the agencies available. There are not sufficient resources at hand or in prospect to enable me to produce satisfactory results in any part of our work, speaking in State-wide terms, and the sooner the public understands this, the more immediate is assistance likely to be provided.

In the law enforcement department there are these conditions, — the State is divided into 28 districts, averaging 415 square miles and containing from 5 to 22 cities and towns each. Each district (except one now vacant) is in charge of a deputy. Deputies in shore districts are expected also to patrol the vast water areas inside the 3-mile limit. Two deputies are used for special assignments. A chief deputy directs the work. The men draw a maximum monthly salary of \$119.24. Some worked for years at a monthly maximum of \$100. Those covering the more inaccessible districts are allowed a maximum traveling expense of \$31 monthly; the others, \$26. The Division owns four Ford cars and one motor cycle with a side car, located in the districts where they can be used to the greatest advantage.

Massachusetts embraces one of the finest wild fowl grounds on the continent, and also over 350 miles of coast, within which area lie some of the most valuable fish and shellfish areas in the world. In these waters the Division annually places large numbers of live short lobsters taken from outside shipments. Yet the Department does not own a single boat with which to patrol this area or to use in planting fish and shellfish. It is next to impossible to hire boats for police duty. A number of the deputies are kept out of their districts for substantial periods of the year to work on fish distribution, seining and operation of field stations. There is no alternative, for the work must be done, and there are no funds with which to hire outside help. No careful analysis of the foregoing is required to show that the number of men, operating expenses and equipment available are totally inadequate to satisfactorily enforce the fish and game laws of this State.

In the work of fish propagation we face conditions like these, — there are approximately 950 great ponds in the State suitable to be stocked and 4,000 miles of streams, not to mention the alewife, smelt and other valuable fisheries in our coastal waters. Last year from the appropriation of \$72,000 for propagation work, \$40,015.35 was expended in the propagation of fish. Out of this sum three fish hatcheries and two rearing stations were operated, and \$6,500 was expended in the distribution of fish (exclusive of the salaries of the wardens employed in the work). Field stations were operated for collection of smelt eggs and for seining and distributing white perch, and small sums spent for miscellaneous work. Again it is evident that with this sum and the limited agencies little more than a start can be made towards adequately stocking all of these waters annually. The advent of the automobile having made waters easily accessible, unless a body of water can be substantially stocked every year but little is to be gained in the long run.

Again, when it comes to bird propagation, there are approximately 8,000 square miles of land in the State, most of it suitable for some species of game. Last year (1919) \$23,371.88 was spent in the propagation of pheasants, mallard ducks and some quail, black and wood ducks. The average price of the limited number of pheasants offered by commercial dealers ran from \$3. to \$5 per bird. Up to the present we have not been able to produce pheasants at this cost. From birds reared at the game farms and purchased from dealers, 1,481 young and 158 adult pheasants were distributed, together with 156 quail, 2,218 young and 347 adult mallards, 106 wood and 65 black ducks. Again it is evident that the stock distributed could make but little impression on the vast area to be covered.

Five hundred and eighty-five white hares, costing \$1,140, were distributed, which is about the number which would be required annually to substantially stock any one of the many good white hare counties in the State. During the past three or four years mounting prices of all goods and supplies used at the stations, shortage of help and absence of funds to carry on the normal amount of replacement and new construction have seriously retarded production. But assuming maximum production, it is evident that the total is wholly insufficient to do the stocking required annually to maintain a reasonable supply of game in our covers.

Fish distribution comes at a time when all of the trained force is needed at the hatcheries, so that practically all of the fish are delivered by our deputies to applicants, who receive the fish at the car door, having been previously instructed how to plant it. In spite of the good intentions of the receivers it is certain that many consignments of the fish, which have cost money and great labor to rear, are entirely wasted through improper planting. Each consignee provides transportation from the car door to the waters to be stocked. If the Department had to assume these transportation charges and provide a trained man to handle and plant each shipment, it would practically have to go out of business. Yet the fact remains that much of our work to-day goes to naught by reason of the foregoing circumstances.

In 1909 the appropriation for operating the Department was \$63,530; in 1914, \$131,815; in 1919, \$163,400. It will be seen, with the advance in prices of foods, materials and labor, that relatively we have had a small increase, if any, to meet the growing demands of the work. In 1914 in the central office there were (exclusive of commissioners) seven to do the work. During the past year there have been eight persons. Meantime a new lobster license has been provided, as well as a combined hunting and fishing license, and the general volume of business has increased to the point where all of our force is so overworked that the taking on of new duties with the hope of discharging them adequately is out of the question without additions to the force. The quarters at the State House are so congested that the maximum efficiency cannot be gotten out of the force now at our command.



The foregoing statements reveal the present situation and what may reasonably be expected in the future development of the Division unless more money is provided. These facts, I believe, will enable the people in the Commonwealth who are interested in wild life to understand the situation as they never have before. There is no intention to present a mournful picture, or to lay the foundation for excuses for failure to record accomplishments in the future. Every effort will be made to reduce the overhead and general operating expenses to a minimum and to utilize every facility at our stations for an increased production of stock. Likewise with the force, funds and equipment available the laws will be enforced.

The meeting was then thrown open for a discussion of the various phases of the work. There was a large attendance by representatives from all parts of the State, and most of the larger phases of the work were fully discussed, though no votes were taken on any proposition. At the dinner in the evening unusual wild life pictures were shown, and it was significant that long after the dinner was over groups of sportsmen remained in the room, talking over various phases of the work. The great benefit from the conference and the dinner lay in bringing together men from all parts of the State to exchange their views publicly for the benefit of all. At the close there appeared to be a fuller appreciation and tolerance for the other man's sport, such as must be exercised in a State like ours, where, by reason of the differences in local conditions, the counties along the shore and the counties in the western section are as far removed in their problems as though separated by many hundreds of miles.

#### QUARTERS.

In August the Division was transferred to quarters on the fifth floor in the east wing of the State House, opposite the quarters of the Conservation Commission and Division of Forestry, thus bringing the two divisions together.

#### ACTIVITIES OUTSIDE THE STATE.

The Director, on January 22, appeared before the committee on merchant marine and fisheries in Washington in opposition to the bill which sought to prohibit the shipment into the

United States of lobsters less than  $10\frac{1}{2}$  inches in length, taken outside its territorial limits.

On March 1 and 2, the Director, in company with the Commissioner, attended the meeting of the American Game Protective and Propagation Association in New York, where each year the game breeders of the country gather to discuss the many baffling problems in the propagation of game birds. Massachusetts contributed a paper on the winter feeding of birds.

The Division was represented by its biologist at the convention of the National Association of Fisheries Commissioners at Atlantic City on June 15 to 17.

On June 22 and 23 the Director was called to a meeting of the Advisory Committee to the Department of Agriculture on the Migratory Bird Treaty Act, of which he is a member. July 26 he conferred in New York with the committee to which he was appointed by the advisory board for the purpose of laying plans for the establishment of a wild life foundation.

The meetings of the American Fisheries Society (September 20 to 22) and of the International Association of Fish, Game and Conservation Commissioners, (September 23 and 24) held in Ottawa, Can., were attended by the Director, the Inspector of Fish and Superintendent Arthur Merrill.

#### FINANCES.

No material changes have been made in the method of handling appropriations, the present plan proving very satisfactory. The following table reveals the financial operations for the fiscal year Dec. 1, 1919, to Nov. 30, 1920: —

	Available 1919 Balances and Amounts appropri- ated in 1920.	Expended during 1920.	Balances Nov. 30, 1920.
Salary of the Director, . . . . .	\$3,800 00	\$3,799 98	\$0 02
Personal services of office assistants, . . . . .	8,075 00	7,905 01	169 99
Expenses, . . . . .	13,300 00	12,806 17	493 83
Exhibitions, . . . . .	1,000 00	952 66	47 34
Enforcement of laws: —			
Personal services, . . . . .	51,500 00	50,839 23	660 77
Expenses, . . . . .	18,300 00	18,126 24	173 76
Biologist: —			
Personal services, . . . . .	4,080 00	4,050 00	30 00
Expenses, . . . . .	2,450 00	1,847 64	602 36
Propagation of game birds, animals and food fish, . . . . .	85,887 00	85,808 56	78 44
Sale and cold storage of fresh food fish, . . . . .	5,500 00	4,201 27	1,298 73
Fishways (balance 1918 and 1919), . . . . .	15,131 92	11,523 99	3,607 93
Chapter 153, Special Acts of 1919 (balance): —			
Rearing stations, . . . . .	2,500 00	—	2,500 00
Construction of a pond at Palmer, . . . . .	500 00	493 80	6 20
Construction of a head trough at East Sandwich, . . . . .	1,015 92	—	1,015 92
Purchase of land at Montague, . . . . .	1,850 00	1,850 00	—
Construction of an ice house at Montague, . . . . .	300 00	—	300 00
Construction of road at Montague, . . . . .	200 00	189 30	10 70
Extending pond at Montague, . . . . .	300 00	299 25	75
Construction of an ice house at Amherst, . . . . .	300 00	—	300 00
Construction of an ice house at Pittsfield, . . . . .	300 00	—	300 00
Construction of a road at Pittsfield, . . . . .	150 00	—	150 00
Certain improvements and purchase of land, etc. (Chapter 225, General Acts of 1920).			
Amherst rearing station, . . . . .	1,000 00	951 47	48 53
Marthas Vineyard Reservation, . . . . .	650 00	250 00	400 00
Montague rearing station, . . . . .	2,000 00	1,462 11	537 89
Palmer fish hatchery, . . . . .	4,950 00	2,654 70	2,295 30
Sandwich fish hatcheries, . . . . .	4,475 00	4,368 47	106 53
Sutton fish hatchery, . . . . .	2,000 00	1,995 73	4 27
Wilbraham game farm, . . . . .	500 00	33 65	466 35
Totals, . . . . .	\$232,014 84	\$216,409 23	\$15,605 61

The following is the revenue received as a result of the activities of the Division of Fisheries and Game for the fiscal



year ending Nov. 30, 1920, and turned into the treasury of the Commonwealth:—

Licenses (see analysis below), . . . . .	\$104,189 55
Sale of materials at game farms and fish hatcheries, . . . . .	962 82
Sales of game tags, . . . . .	5 50
Sale of forfeited rifle, . . . . .	12 00
Sale of forfeited deer, . . . . .	104 78
Sale of Hadley hatchery property, . . . . .	200 00
Sale of Adams hatchery property, . . . . .	1,200 00
Rent of Chilmark Pond, . . . . .	75 00
Rent of shanty at Monomoy, . . . . .	10 00
Interest on bank deposits, . . . . .	43 61
	<hr/>
	\$106,803 26

*Analysis of License Returns.*

FORM OF LICENSE.	Total Number issued.	Gross Value.	Fees to Clerks.	Net Return to State.
Resident citizen's combination, at \$1, . . . . .	94,600	\$94,600 00	\$14,104 80	\$80,495 20
Non-resident citizen's combination, at \$10, . . . . .	317	3,170 00	47 55	3,122 45
Non-resident citizen's combination, at \$1, . . . . .	228	228 00	34 20	193 80
Alien foreign-born combination, at \$15, . . . . .	155	2,325 00	22 80	2,302 20
Minor trapper's, at 25 cents, . . . . .	1,069	267 25	160 35	106 90
Resident citizen's fishing, at 50 cents, . . . . .	38,550	19,275 00	5,782 50	13,492 50
Non-resident citizen's fishing, at \$1, . . . . .	2,864	2,864 00	429 60	2,434 40
Non-resident citizen's fishing, at 50 cents, . . . . .	97	48 50	14 55	33 95
Alien foreign-born fishing, at \$1, . . . . .	1,448	1,448 00	217 20	1,230 80
Lobster fisherman's, at \$1, . . . . .	914	914 00	136 65	777 35
Totals, . . . . .	140,242	\$125,139 75	\$20,950 20	\$104,189 55

Thus the net return from licenses, after deduction of clerks' fees, was \$86,220.55 for hunting or combination licenses, \$17,191.65 for fishing licenses for inland waters, and \$777.35 for lobstermen's licenses, a total of \$104,189.55, showing an advance over last year of \$32,694.50.

ASSOCIATIONS.

Each year finds the fish and game associations coming forward more and more with practical accomplishments for the cause. Mention can be made only of the largest and most original pieces of work, for to enumerate all the work in distribution of stock, purchase and liberation of game and fish

by private subscription, the molding of public sentiment and the support of desirable legislation, would be to call the entire roll, so general is now the work along these lines.

The particular new features which have come to our attention in 1920 are: —

The Springfield Fish and Game Association raised funds for an automobile which was placed at the disposal of the district warden.

The Fitchburg Sportsman's Club by permission seined a local reservoir, where fish life had increased abundantly, and redistributed the fish in local ponds open to the public.

The Canton Fish and Game Protective Association in the spring of 1920, under supervision of one of the State fish culturists, erected a rearing station on a brook in Sharon. There were 14,000 fry furnished by the State in July, and a member of the club living near by fed and cared for them.

The president of the club wrote: —

I never saw anything grow as fast as these fish. Many of them were 6 inches long when we put them out, and I should say that the bulk of them were 5 inches in length the first of October. We started to put them out the first of September as the brook was pretty crowded as the fish grew. We got them out by October 1, and I think it is the best thing the club has done for fishing in Canton. We distributed the fish in all the trout brooks in Canton and Sharon, and it should make good fishing if this work is kept up for a few years. As to the expense to the club, it was surprisingly small. For labor and lumber it wouldn't amount to more than \$20, as most of the work was done by the club members. The feed was about \$85, with express. The distribution took six afternoons with a truck, and was done by club members.

This is an example of what a body of live men can accomplish for their locality.

Similar stations are operated by the Southeastern Massachusetts Fish and Game Association of Brockton, — where this year 50,000 fry were reared to fingerlings, — and the Southern Worcester County Fish and Game Association.

The Huntington Rod and Gun Club bought and planted wild rice seed.

The Cape Cod Fish and Game Association took 650 bass from Long Pond, Falmouth, and distributed them in several of the larger ponds within the township.

### EDUCATION AND PUBLICITY.

It is difficult to separate into a special statement the work of the Division in relation to education. It should be emphasized annually that the educational work of the Division, seeking to assist the people to think straight and conservatively in reference to the wild life problems, is one of the most important branches of the service. Careful attention paid now to instructing the youth of the State to protect and use sparingly its natural resources will be the greatest factor of all twenty years hence in meeting the problems sure to arise. There will never be any more land in the Commonwealth. There will never be a larger number of great ponds, and the available streams are apt to diminish rather than grow. More wooded areas may develop, but it will be a long time before the annual growth will equal the annual cut. But the population will grow, and an increasing number of hunters and fishermen will go afield each year. The methods of transportation will quicken, and even the remote places will become increasingly accessible. The drains on our resources will enlarge, and the problem will be to meet all these with certain physical agencies which will never be greater. The Commonwealth must instruct its citizens, and this means that the youth of the land must be taken in hand. The problem must be made attractive, and conservatism must be taught.

Lecture work, both with stereopticon slides and with moving pictures, has been continued as in other years. Forty-five such talks were given by the chief warden alone, not to mention the many by the Director and other officials. The lecture work should properly be conducted by an individual with no other duties. At present the burden is borne by officials responsible for important branches of the work, and the late hours entailed, following a full day of work at the office, constitute a severe strain. There have been acquired this year moving-picture films showing the heath hens of Marthas Vineyard in their characteristic mating season antics; Sutton trout hatchery; shipping of trout and salmon from Palmer hatchery; pheasant rearing at Wilbraham by use of hens, and at Marsh-



field by incubator method; and seining of white perch at Tashmoo Lake, Marthas Vineyard.

Nine exhibits of mounted specimens and live fish and game were made at county fairs, including one at the annual meeting of the National Grange in Boston and at the Eastern States Exposition at Springfield.

## ENFORCEMENT OF LAWS.

### PERSONNEL.

There were few changes in personnel. Fred R. Ziegler of Pittsfield left the service to enter private business, after having had charge of the central Berkshire district for the past fifteen years. In his resignation the Commonwealth lost an efficient officer. One addition was made in the appointment to the regular force of James A. Peck of Allston, a former special officer. William Day and Harry G. Higbee, superintendents of the Myles Standish State Forest and the Moose Hill bird sanctuary, respectively, are now rated as regular fish and game wardens.

The force of volunteer unpaid wardens has been increased substantially. Although many of them, from pressure of business, are unable to devote much time to actual patrol work, yet in many communities it is felt that the moral effect of their possession of this authority is noticeable.

Under the old régime the officers of this Division were known as "deputy fish and game commissioners," but with the reorganization their official title was changed to "fish and game wardens." Although the Legislature this year granted the funds to substantially increase their salaries it is yet felt that these men are underpaid, considering the exacting and hazardous nature of their duties. This is evidenced by the small number who seek appointment as wardens and the difficulty in getting men of the right caliber at the salary offered at the start; and unless some incentive is offered, this important work in time to come will fall upon persons lacking the necessary qualifications and interest to effectively push forward the cause when the present incumbents lay down their tasks.

The public oftentimes little knows nor appreciates the scope of the duties performed by the wardens. Working, many times alone, at all hours of the day and night these men inconspicuously and effectively carry out their tasks and bring to justice persons on whom peaceful persuasion fails and who will continue to break the laws until they are made to pay

the penalty. The Legislature of 1920 recognized the hazardous nature of the service by making provision for the retirement on half pay, for the remainder of their lives, of salaried wardens injured in the performance of their duties.

At present, because there is no other available assistance, it is necessary to use the warden force, sometimes months at a time, on fish distribution, salvage work and work at the various stations. This is an additional handicap on law enforcement operations.

It is a satisfaction to note the increasing interest on the part of the public in fish and game matters, and it is showing itself in a better observance of the laws and greater efforts to conserve the wild life, particularly by the winter feeding of the birds. The courts, too, are backing up our officers in punishing those brought before them for violations of the fish and game laws, for they realize that under present policies arrests are made as a last resort.

#### EQUIPMENT.

The one great, outstanding need of the law-enforcement work is the motorization of the force. This has been dwelt on in previous reports. With the advent of the automobile, which in one day will take sportsmen to several of the most remote hunting and fishing grounds, and with the constant curtailment of trolley and train schedules, to say nothing of increasing rates, the time has come when each warden should be equipped with an automobile to provide him with independent means of transportation. Until this is done, and while he must subject the needs of his service to the schedules of ordinary transportation, it cannot be expected that he can successfully cope with the motorized sportsman who a few years ago was unknown. Appropriations, however, prohibit appreciable progress on this line. During the past year sufficient money was granted to purchase two Ford touring cars and one Ford truck. Thus, with the two machines previously acquired and one borrowed from the biological department in busy seasons, there are six machines available for patrol work.

A Ford touring car, to be used in law enforcement work in the Springfield district, was presented to Warden James P.



Hatch by the Springfield Fish and Game Association. This donation exemplifies a splendid spirit of co-operation.

The work of equipping the wardens with up-to-date revolvers, handcuffs, field glasses, snowshoes, and other equipment necessary in their work is nearly completed.

### COURT CASES.

The actual number of cases presented to the courts exceeded the total of last year.

#### *Classified Court Cases, Dec. 1, 1919, to Nov. 30, 1920.*

VIOLATION.	Fines imposed.	Costs paid.	Number of Cases.	DISPOSITION.			
				Discharged.	Convicted.	Appealed.	Filed.
Aliens with firearms, . . .	\$900	\$5	18	4	14	2	6
Birds:—							
Protected at all times, . . .	195	10	13	1	12	3	1
Quail, close season, . . .	60	—	1	—	1	1	—
Partridge, close season, . . .	60	—	3	—	3	—	—
Pheasants, close season, . . .	25	—	2	—	2	—	—
Waterfowl, close season, . . .	—	—	1	—	1	—	1
Game:—							
Exposing poison for birds or animals.	50	—	1	—	1	—	—
Deer, close season, . . .	150	—	4	1	3	—	—
Using rifle during deer week, . . .	10	—	1	—	1	—	—
Rabbits, close season . . .	—	—	1	—	1	—	1
Squirrels, close season, . . .	50	—	8	—	8	—	3
Raccoons, close season, . . .	10	—	1	—	1	—	—
Muskrats, close season, . . .	10	—	4	—	4	—	—
Skunks, close season, . . .	70	—	5	—	5	—	—
General (game):—							
Hunting without license, . . .	380	15	35	1	34	—	12
Hunting on posted land, . . .	20	—	3	1	2	—	—
Hunting on State reservation, . . .	10	—	3	2	1	—	—
Hunting on Lord's Day, . . .	350	—	35	1	34	—	4
Hunting during temporary close season.	105	10	10	—	10	—	4
Assault on wardens, . . .	15	—	2	1	1	—	—
Securing license unlawfully, . . .	35	—	3	—	3	—	—

*Classified Court Cases, Dec. 1, 1919, to Nov. 30, 1920 — Concluded.*

VIOLATION.	Fines imposed.	Costs paid.	Number of Cases.	DISPOSITION.			
				Discharged.	Convicted.	Appealed.	Filed.
General (game) — <i>Con.</i>							
Refusing to show license, . . .	-	-	1	1	-	-	-
Name not on traps, . . . .	\$45	-	4	-	4	-	-
Trapping without owner's permit,	50	-	7	-	7	-	2
Illegal traps or snares, . . .	55	-	4	-	4	-	1
Fish: —							
Bass, close season, . . . .	5	\$5	1	-	1	-	-
White perch, short, . . . .	400	-	4	-	4	-	1
Trout, short, . . . .	30	-	2	-	2	-	-
Pickereel, short, . . . .	11	-	3	-	3	-	-
Pickereel, sale, . . . .	-	-	1	1	-	-	-
Lobsters: —							
Short lobsters, . . . .	406	10	16	1	15	1	2
Interfering with traps, . . .	-	-	1	1	-	-	-
Fishing without license, . . .	60	-	9	-	9	-	4
Shellfish: —							
Scallops, bag limit, . . . .	10	-	1	-	1	-	-
Scallops, taking without a permit,	-	-	2	1	1	-	1
Oysters, taking without a permit,	-	-	2	-	2	-	2
General (fish): —							
Smelt, close season, . . . .	25	-	4	-	4	-	3
Fishing in fresh waters other than with hook and line.	25	-	4	-	4	-	-
Seining in fresh water, . . .	-	10	2	-	2	-	2
Fishing in stocked waters without a license.	446	5	61	1	60	-	13
Maintaining fish traps, . . .	20	-	3	-	3	-	3
Fishing with more than ten hooks,	-	-	2	-	2	-	2
Totals, . . . .	\$4,093	\$70	288	18	270	7	68

Following convictions in court 5 fishing licenses, 61 combination licenses, 2 alien licenses, one non-resident license and 2 lobster fishermen's licenses were revoked and 7 surrendered without court action. The loss of the license is in many cases a more severe punishment than the fine.

There is an idea prevalent in many quarters that the aliens

are the worst violators of the fish and game laws, but the fact that only one alien license has been revoked and that the number of aliens before the courts for failure to have a license was not exceptionally large, will bear out the belief that many times the public is too prone to place all the blame on the aliens, while, on the other hand, foreign-born residents are learning to do their share in the protection of game.

No attempt was made last year to enforce the provisions of the new fishing license law, the remainder of the year after its enactment being devoted to a campaign of education. Enforcement of the law was commenced this year, and 65 cases brought to court.

While it is difficult to point to the work of any one warden as surpassing the record of another, the following are a few instances of exceptionally effective operations: —

On April 1 Warden Fred R. Ziegler of Pittsfield, assisted by Wardens Hatch, Sargood, McCarthy, Monahan and Nichols, raided two houses at Richmond and took into custody three unnaturalized foreign-born residents. They were charged in court with illegal possession of firearms. Several firearms were seized and confiscated in the raid.

On September 4 Wardens Grant and Ellis apprehended George Augustino, Genesieti Bruno and Joseph Dorzio at West Newbury under the same law. Each paid a \$50 fine and forfeited his gun.

Despite the wide publicity given to the close season on wood ducks by means of illustrated posters, John J. Bowman of Waltham killed three wood ducks in Littleton on September 16. Wardens Backus and Crosby, operating in that section, took him into custody and found his machine parked within 50 feet of one of these posters. He paid \$30 in the Ayer court on the following day.

On October 9 Warden Grant and unpaid warden G. W. Manthone apprehended Giovanni Riccardo at Beverly with four robins in his possession, for which he paid a fine of \$40 in Judge George B. Sears' court in Salem.

On January 30, at a time when the birds were maintaining a fight for existence during a rigorous winter, and while hundreds of persons were volunteering their services in putting



out feed to tide them over, Strene Senti of Scituate took advantage of the situation and shot three quail. When summoned before Judge George W. Kelley of Hingham by Warden Steele this offender was fined \$60.

Chalmers W. Shattuck of Winchendon admitted on March 5 that he put out the poisoned bait which caused the death of three foxes and one dog. Warden Stratton haled this man before Judge Frank B. Spalter of Winchendon and a fine of \$50 was imposed.

Warden Macker of North Grafton apprehended Max Grat of Westborough with sixty-one short white perch, for which Judge William E. Fowler of Westborough imposed a fine of \$330; however, because of the man's financial condition, the court accepted \$40 in settlement of penalties.

Sunday, October 17, Warden Seaman and Special Warden E. N. Grinnell found Gennirao De Iorio of Providence, R. I., hunting in Rehoboth. Charges for hunting on Sunday and having one gray squirrel in his possession were preferred. Judge Frederick E. Austin fined him \$10 on each charge in the Taunton court. This man resisted arrest by threatening to use his shotgun on the officers should they attempt to take him. For this he paid an additional fine of \$15.

On August 14 Patsy Patianello of Florida killed a deer and paid a fine of \$50 in the North Adams court on complaint of Warden Nichols. He was charged further with the violation of the alien gun law, but this charge was placed on file on forfeiture of the gun.

On April 2 John Horr of Prescott, on complaint of Warden Shea, paid a fine of \$50 for killing a deer out of season. Warden Shea also arrested Milton F. Webster of Malden at Prescott on April 19 for taking short trout, for which a \$20 fine was paid.

#### FEDERAL LAWS ON MIGRATORY BIRDS.

Following the decision of the Supreme Court establishing the constitutionality of the migratory bird treaty between the United States and Great Britain, the officers of the Biological Survey at Washington, thus definitely assured of the legality of their work, took such steps as their limited appropriations

would permit to enforce the provisions of the law relative to migratory birds. Albert E. Stadlmeir of Lackawanna, N. Y., for many years an interstate commerce inspector and prior to that a New York State game warden, was assigned to cover Massachusetts, Rhode Island and Connecticut, making his headquarters at Providence. In co-operation with the wardens of Massachusetts (all of whom are now United States deputy game wardens) Warden Stadlmeir laid plans early in August for enforcing the Federal regulations on shore birds. Believing in fair play above all, the public were first informed through the press of the provisions of the existing laws, and the intention of the officials to enforce them. On August 16, eighteen wardens were assigned to cover the coastal territory, and in conjunction with Warden Stadlmeir carefully checked up all gunners, with the result that fifteen who had failed to heed the warning were haled before William A. Hayes, 2d, United States commissioner at Boston.

#### LOBSTER LAWS.

It can be definitely stated that the lobster laws are being better observed, due largely to the splendid influence of the many lobstermen's associations along the shores. The following comprise the most important cases for violations of the lobster laws: —

On May 30 Martin Korajardski of Manchester was arrested by Wardens Babson and Grant for possession of thirteen short lobsters, and fined \$26 by Judge George B. Sears of Salem. Failing to profit by this experience, on August 12 he was again arrested by Warden Babson for having four short lobsters, was fined \$8 by the same judge, and automatically forfeited his license for one year, as is the case in convictions for a second violation of lobster laws.

On the night of July 3 several wardens under the direction of Warden Ellis raided several of the South Shore hotels in quest of illegal lobsters. As a result, John Madan of Marshfield on July 16 was fined \$100 by Judge H. B. Davis of Plymouth for having twenty short lobsters, and in the same court Delia J. Baron of Marshfield paid \$40 for having eight "chicken lobsters" in her ice box.

On August 7 Charles S. Bigwood of Salem was summoned before Judge George B. Sears by Warden Edward Babson and unpaid deputy B. W. Manthone to give reasons for possessing seven short lobsters. Having no adequate excuse and this being the second offence, he was fined \$35 and lost the privilege of fishing for lobsters for one year.

L. A. Cahoon of Beverly was found by Wardens Goodwin and Grant on September 24 with twenty-three short lobsters, and Judge Sears of Salem, when informed of the situation, decreed that a deduction of \$40 from Mr. Cahoon's receipts might enable him to remember the legal measurement a little better.

On September 6 Carl F. Norberg of Rockport, summoned before Judge York of Gloucester on complaint of Warden Babson, for having twenty-four short lobsters, paid a fine of \$48.

At present the Division owns no boat which could be used to enforce the lobster laws, and it is impossible to state forcibly enough how great a handicap this is to the work. Furthermore, it is next to impossible to hire a boat for patrol work, and until the Legislature sees the necessity of a boat for the enforcement of these as well as many of the laws pertaining to coastal hunting and fishing, there can be no remarkable achievements along this line.

#### LEGISLATION.

At the present time it appears that the average sportsman is satisfied with the fish and game laws as they exist, and very little complaint is heard on the whole.

The fish and game laws enacted by the Legislature of 1920 were, briefly:—

Chapter 139, providing for the utilization of scallops, which, owing to unusual circumstances, such as severe winter weather, could not be taken at the usual time, and which unless taken would be wasted.

Chapter 208, extending the scope of the law protecting wild birds (chapter 20, General Acts of 1917) so as to include possession as well as capture.

Chapter 273, permitting the use of live geese decoys in hunting waterfowl in Nantucket County.

Chapter 284, giving to the selectmen of Marblehead the supervision of the taking of flounders within their harbor.



Chapter 291, authorizing ten-year leases of the alewife fishery in the stream running between Cohasset and Scituate, the former short-term leases having made the development of a fishery impracticable.

Chapter 300, clearing up ambiguity in that part of the act relating to the licensing of minors, and providing a small fee for trapping certificates.

Chapter 339, empowering the Commissioner of Conservation to make rules and regulations relative to the taking of salmon.

Chapter 425, shortening the rabbit season, prohibiting sale of hares killed in Massachusetts, and closing Barnstable, Dukes, Nantucket and Norfolk counties to rabbit hunting until 1923.

Chapter 434, restricting the issuance of licenses for the catching of lobsters to citizens of the Commonwealth.

Chapter 437, establishing a close season during breeding time on certain fur-bearing animals.

The recommendations made to the Legislature for changes in the fish and game laws will be found in the Appendix.

## BIOLOGICAL DEPARTMENT.

### GENERAL.

The past year has witnessed a marked development in practically all branches of the work of the biological department, brought about by the establishment of a permanent laboratory at the State House, the equipment of a traveling laboratory, the use of an automobile in field work, the employment of a field and a clerical assistant, and a separate financial budget. All of these circumstances have tended to place the biological department in a position to widen the scope of its routine and research work upon the many and varied problems having to do with fish and game. The laboratory is now equipped with tables, running water, electric and gas fixtures, and the apparatus necessary to a well-appointed laboratory. Thus, for the first time in the history of the Division, it is possible for its laboratory work to be conducted at the center of activities.

### REPORTS.

Two special reports were printed: "Standard Methods for the Examination of Lakes and Streams" and "A Report upon the Alewife Fisheries of Massachusetts."

### SURVEY OF INLAND WATERS.

During the winter months considerable attention was devoted to the classification of the lakes and streams of the Commonwealth from data secured in previous surveys, with the idea of establishing a definite stocking policy, by thus throwing light upon the various problems of fish environment. The specific proposition of ascertaining the advisability and proper method to be pursued in the stocking of the Westfield River with brown trout was similarly worked out.

### SMELT.

An attempt was made to study the spawning habits of the smelt and the results obtained from artificial planting of smelt spawn, but the failure of the Weir River run of smelt rendered completion of the work impossible.

## ALEWIFE.

Work with the alewife this year comprised a study of its spawning habits, observations on the runs in various streams, and investigation of methods of transplanting and artificial hatching. Investigation of dam locations on the more important alewife streams were conducted, with a view to bringing about the installation of fishways where they might be necessary to re-establish or perpetuate the fisheries. In many instances owners of such obstructions were interviewed with regard to this matter, their dams surveyed, and plans for satisfactory forms of fishways submitted to them.

## BIRD DISEASES.

Observations were made upon a spontaneous sarcoma occurring in semiwild mallard ducks on Suntaug Lake, Lynnfield.

## FISH DISEASES.

The entire summer was spent in the study of a disease epidemic among trout at the East Sandwich hatchery, detailed report of which appears with the report of the Sandwich hatcheries. It proved to be of extraordinary virulence and wide distribution, being by nature bacterial, and causing a form of blood poisoning. Although no cure for the diseased fish was found, the study proved highly satisfactory as regards prevention of a recurrence of this incident.

Acknowledgment is made at this time of the courtesy of the United States Bureau of Fisheries in permitting certain phases of this work to be conducted at its Woods Hole station.

## POLLUTION.

The effect upon brook trout of certain chemicals present in trade wastes was investigated, and observations made as to the minimum amount necessary for direct injury.



## WILD BIRDS AND ANIMALS.

### BREEDING SEASON.

Consequent to the long struggle to preserve an existence through the rigorous winter of 1919-20 (a period of almost unbroken cold, continuous snows and scarcity of food) the birds which survived entered on the breeding season in a depleted physical condition, and there was good reason to fear that the results of the winter would be reflected in the spring hatch. While some parts of the State had reasonably good weather, in many sections there were periods of low temperature, cold rains and dampness. But in spite of this the majority of the reports are to the effect that the birds did well, producing normal broods, and in many cases larger broods than usual.

### POSTED LAND.

So far as can be observed the posting of land has not increased. In certain sections, through the co-operation of the local sportsmen's associations, much land formerly posted has been again opened. While the number of persons interested in wild life is increasing, a greater spirit of tolerance towards the sportsmen during the open season is being shown by them. On the other hand, greater vigilance is being displayed to stop all hunting during the close season, and the landowners are becoming more and more a factor in assisting us in this work.

### WINTER FEEDING.

The tendency of the past few years appears to have been to give increasing attention to the artificial propagation of game and game birds, with decreasing attention to the care and increase of the stock in the wild, other than to provide shorter open seasons and bag limits. Prior to the time that the artificial propagation of certain game birds was started in the United States on a rather large scale by a few individuals and some of the State fish and game commissions, the accumulated knowledge of the habits of the native game birds was applied but little in a practical way toward surrounding the

birds with those conditions which would be especially favorable to them during the breeding cycle. In the "old days" the tendency was to say, as the birds began to decrease in numbers, that there should be shorter open seasons, bag limits, and more complete law enforcement, and to let it go at that. If the birds had a particularly hard winter, followed by an unfavorable breeding season, the matter was apt to be taken philosophically, with the remark that the birds "would come back." This process of "coming back" meant little or nothing as far as human agencies to assist them were concerned, and actually only represented the optimism of those interested in bird life that nature would favor the birds over a substantial period of time and that all the destructive agencies would operate at a minimum. In other words, after taking steps to curb the destructive tendencies of man, the birds were left to their own devices in their fight for self-preservation.

With the advent of the game farm began an intensive study of causes and effects in the life history of the native game birds, and our knowledge has been enlarged. As a result, more people are asking whether the same principles which apply to the care of game birds in captivity should not be considered in connection with the wild stock, so called, in the open. And first and foremost arises the question, "If it is true of the birds in captivity that one of the first essentials of a successful breeding season is healthy, strong and virile brood stock, isn't it just as true that the wild birds, to enter upon a successful breeding season, should be in like condition?" "Is it reasonable to suppose that birds which have had to fight for their existence through the rigors of a long, hard winter, and who enter upon the breeding period in a worn-out, devitalized condition, will breed as satisfactorily as birds which have come through the ordeal in a hardy and vigorous state?" There can be but one answer. Hence the activities of the Division over a period of several winters past.

The most important single factor appears to be suitable food, — not only grains but likewise grit. The quail and pheasants require the greatest attention. The grouse, if located in a good grouse country, is amply able to obtain a sufficient food supply. Should he find himself during a try-

ing period on any other than a favorable range, not much can be done for him.

Proof of the value of winter feeding is furnished by the following incident. A farmer in Marshfield, who had fed several flocks of quail on his land, missed an entire covey of ten after the storm of March 6, 1920, and gave them up for lost. On the 11th after the snow had melted somewhat, three returned, and on the 14th the entire ten were back. Later he found the spot where they had been imprisoned under the snow for eight days. That these birds returned alive and well after a week under the snow without food is without question due to the fact that they were well fed and in good condition before the storm imprisoned them.

Feeding methods have been described rather fully in previous reports. Each year presents a different problem, weather conditions being the determining factor.

For the winter of 1919-20 a period of extreme and extraordinary severity must be recorded, and one which brought great hardship and loss to the wild life of the State. It was the most trying winter in the experience of the Division. About the middle of January there was a heavy snowfall all over the State, which was drifted badly by the accompanying high winds. From that time until February 1 there was a period of continuous cold, frequent snows, and temperatures ranging as low as 16 below in the eastern and 25 below in the western part of the State. Even after the backbone of the first long cold wave was broken, frequent and severe storms kept the ground covered and feed inaccessible.

With the coming of the severe weather, appeals were made through the press to organizations and individuals to do their part in providing food and forming artificial shelters by piling up boughs, or lacing them together to form sheltered places in which to place the feed. Grain was distributed by the wardens, and sent to applicants on request as long as funds permitted. There was \$934.14 expended for grain from the Division's appropriations. In practice it is difficult to place the grain with those persons who will use it for game and songbirds rather than for sparrows and pigeons. Accompanying each shipment of grain was a notice to feed the birds only when they



were *in extremis*; that it was not a question of keeping them *fat*, but rather of keeping them *alive*, and that this was all the State's resources permitted. The sum set aside for this work was exhausted long before the critical period was past. Upon learning this donations for the purchase of grain were made by the Massachusetts Audubon Society (\$200), Mabel Lyman of Cambridge (\$5), and R. P. Shumway of Boston (\$50). Even with this help it was impossible to supply 117 applicants. Every agency by which the birds could be reached was utilized. Wardens, familiar with the coveys in their districts, nursed these along through the season. The roads being badly blocked, such methods of feeding were adopted as throwing grain from the rear of trains; feeding along milk routes; and local citizens, hunters, boy and girl scouts carried the work into more remote localities. As an illustration of the extent to which individuals participated in the work, one man — Thomas Rice, Esq., of Fall River — cared for over forty flocks of quail until the going became so bad that he could not reach them. At one feeding station, near a dwelling and convenient for observation, 21 pheasants and 20 quail were seen feeding at the same time. No attempt was made by the pheasants to drive the quail away or show fight, refuting the claim that pheasants drive away the other game birds.

At the close of the season a donation was received of 1,300 pounds of rice damaged in transit by creosote. Being received too late for use this year, it was aired to free it from the creosote and kept for next year. Birds to whom samples of it were fed ate it readily.

The feeding of the waterfowl presents an unsolved problem. It is a singular commentary on things that in a State like Massachusetts the black ducks and many of the diving ducks will linger as the winter approaches, and elect to fight it out midst the ice and snow and bleak head winds of our coastal region rather than to lift into the air and fly southward for a few hours into regions more favorable and where ample food is to be found. Each winter brings reports from one locality or another of great suffering and death among the waterfowl. Though many such rumors have been followed up, no evidence

has been found to show that the loss through winter conditions is anything more than would normally be expected. For instance, ducks and gulls were reported as dying from winter conditions at Moon Island. The trouble was found to come not from cold or starvation, but from oil floating on the water, which gummed up the birds' feathers so as to make them helpless. A significant incident occurred at Moon Island, Boston Harbor, incident to photographing the wild fowl which congregate in large numbers at the open ice holes near the great sewer outlets. Waiting at one of these holes for the return of the birds, which had been frightened away at his approach, the warden, after ten or fifteen minutes, saw three whistlers emerge from the water in the hole and swim about, showing signs of extreme exhaustion. They were captured without difficulty and revived at the life-saving station. The probability is that these ducks had dived for food in a distant water hole; had come up under the ice, struggled along under it, and had they not found the open hole would have suffocated and been carried off by the tide. No doubt this is the cause of a certain amount of the winter mortality.

The attempts which have been made to feed the diving birds have been, on the whole, unsatisfactory. No notice is taken of the grains dropped into the deep water, nor do they take cut-up fish or bread, and the food is appropriated by the gulls in a short time. Most of the air holes occur in localities where the water is too deep for the black ducks to dive for their food, and corn scattered on the ice around the opening merely freezes into the ice out of reach. In considering the problem of winter feeding the wild fowl the wisdom of a course which would localize the birds by feeding at the beginning of winter is open to question.

#### HUNTING SEASON.

Taking into consideration the comparatively small area, the density of population, and the annual drain on the game in our covers and the fish in our waters by the 150,000 hunters and fishermen, it must be admitted that Massachusetts offers a remarkable assortment of opportunities for hunting and fishing. And it is up to the sportsmen to realize that this is their

sport, and that they can make or break it, depending on their attitude toward the problems. If they are satisfied with a reasonable amount of game or fish in a day's outing, find a large portion of their sport coming from the opportunity to get into the big outdoors and in the well-done work of a good dog, without feeling the necessity of killing everything in sight, and without regret over the shots missed or fish lost, they will be putting themselves into the proper frame of mind to get the most out of the good things around them.

When the hunting season of 1920 opened on October 20, the weather was very warm. Summerlike weather had prevailed continuously up to that time, and the leaves were still on the trees and bushes. Little or no rain had fallen for a long time over the entire State, and Cape Cod, where there had been no rain for five weeks, was literally a tinder box. A warning was issued by Acting Governor Channing H. Cox, calling attention to the condition of the fields and woodlands and the danger from fires, to the authority of the Governor to suspend the open season when conditions required, and urging all citizens, as well as those who might go afield, to use the utmost care in preventing fires.

The hope was held that drastic action might be avoided, but by the end of the week fires had sprung up all over the State, especially serious on Cape Cod. The conditions were so serious that on the 23d the Acting Governor, on the request of the Commissioner of Conservation, acting under chapter 422, Acts of 1906, suspended the prevailing open season for hunting until further notice.

It was with the greatest regret that the officials took this action, realizing how keen a disappointment it would be to the gunners; consequently it was correspondingly gratifying to note the good spirit and high quality of sportsmanship with which the situation was accepted. The drought was not broken until the night of the 27th, when a drenching rain fell. On the afternoon of the 28th the Governor lifted the ban.

The Commissioner of Conservation and the Director of Fisheries and Game on October 27 filed a bill, providing for the extension of the season by a period equivalent to the days lost through its suspension, for action at the special session of



the Legislature expected to convene in the middle of November. No action was taken on this bill as the Legislature convened too late. A similar provision was recommended by the Commissioner of Conservation for consideration at the regular session.

### MIGRATORY BIRDS.

#### *Song and Insectivorous Birds.*

There is nothing of special moment to report in connection with the song and insectivorous species for 1920, the activities of the Division in this connection being practically limited to enforcement of the protective laws.

Permits were issued to 70 individuals for the collection of specimens of birds, eggs and nests for scientific purposes; 69 reports on these permits were made; 624 birds were reported as collected and 614 eggs; average number of birds taken per person, based on number of reports, 9+; average of eggs taken per person, 8+.

#### *Migratory Game Birds.*

Each succeeding year seems to present a new problem in the fight to keep the wild life from decreasing. A new problem which has appeared is the presence of oil or waste material of some character on the waters. During the past summer reports have been received of sick and crippled shore birds in an area greatly polluted by oil and other substances floating on the water and deposited on the surface of the marsh.

*Shore Birds.* — The spring flight had little to mark it from the common. The return flight in the summer and early fall was characterized by the presence of a larger number of small birds, particularly the common peep, than has been noted for several years.

*Upland Plover.* — It is regrettable to be obliged to state that the upland plover is just about holding its own. Although granted complete protection in this State, the birds do not appear to be increasing. The fact that more of them are being reported, and further inland from the shore districts, which of late have been their principal range, is a hopeful sign.

*Black-breasted Plover.* — A slight increase can be reported in the black-breasted plover. The spring migration was rather



light, but the summer and fall migration disclosed relatively more birds than usual.

*Golden Plover.* — Golden plover are slightly on the increase, more being reported on the summer and fall migration than has been the case for several years.

*Killdeer Plover.* — The killdeer plover was noted in about the same numbers on the return migration.

*Piping Plover.* — The piping plover is holding its own, though this year flocks of birds on certain ranges, as, notably, around the Third Cliff, Scituate, were broken up by a severe storm.

*Woodcock.* — The spring migration had little to distinguish it from the usual. It is evident that the breeding season in this Commonwealth and to the north was unusually favorable, for more woodcock were reported on the fall migration throughout the State and throughout the whole New England district than has been observed for several years.

As the law now stands the sportsmen are practically precluded from hunting any of the native-bred birds, for the most of them have moved on by the time the season opens on the 20th of October. There may be other contributing causes, as, for example, the closing of what have heretofore been long open seasons in the South, and the more rigid enforcement of the regulations prohibiting sale.

*Jack, or Wilson's, Snipe.* — The migrations of the Jack snipe were not marked by anything unusual. In previous reports it has been stated that the snipe as a sporting bird is very much overlooked in this State. Beginning with the open season on the 16th of September to well into October they are found in many places and in substantial numbers. The indications are that the snipe is gradually on the increase.

*Dowitcher or Red-breasted Snipe.* — The dowitcher was noted over a larger range than usual, and in slightly greater numbers.

*Sandpipers.* — The spotted sandpiper breeds in the State, and reports from many districts mentioned a larger number of breeding birds in the past season than usual, and that the season was especially favorable.

*Yellow Legs.* — The spring flight was about on time and moved northward on schedule. The return migration was marked by an unusual number of birds, especially around the

opening of the shooting season on August 16, and many sportsmen along the entire shore district obtained their bag limits. The winter yellow legs we believe to be slowly on the increase.

*Willet.* — It is always difficult to make a comparison from year to year, but the reports indicate that the willet is holding its own, with some prospect that the bird will escape extinction. It is easily decoyed, and it is to be marveled at that the bird has not already gone with some of the other of the larger species.

*Hudsonian Curlew.* — It is particularly gratifying to be able to report the presence of more Hudsonian curlew along our shores than have been noted for a number of years. They were not localized in any one place, but showed up at various points on both the North and the South shores.

*Godwit.* — The best that can be said of this species is that, taken in conjunction with the flights of the other shore birds as they move along, the godwit was sufficiently in evidence to show that, enjoying as it does the increased protection afforded by the Federal law, it is now holding its own.

*Rail.* — The rails, and especially the Sora, are being sought more and more as part of the game bag, especially in connection with the shooting of the snipe. The rails are increasing in the localities that are especially favorable to them, that is to say, in the reedy areas along the sluggish watercourses.

*Wood Duck.* — Whether it is due to the efforts of the Division in the propagation of wood ducks, together with the protection granted, or to the increased protection under the Federal regulations, it can be stated that the wood duck is gradually increasing. The other side of the story is that the natural range of the wood duck is being encroached upon more and more each year by the drainage of the shallow ponds and the gradual building up around other ponds, making a more rapid restriction on the range of these birds than of any other wild fowl. In order to further protect this species Dr. John C. Phillips of Wenham contributed \$605.85 to the publication and distribution of a poster showing the plumage of the adult male, the adult female and the young male in September. The drawings were by Louis Agassiz Fuertes. This poster was hung in public places throughout the entire State and

bore suitable legends, cautioning the sportsmen to make certain of the species before shooting.

*Mallard Duck.* — With the discontinuance of artificial propagation of the mallard duck, the numbers noted in the State have slightly fallen off. The mallard is little more than an occasional visitor, though, like the pintails, some are taken every year.

*Red-head.* — Red-heads did not show up in usual numbers, and there has been less red-head shooting in the last year or two than formerly. Some of this may be attributed to climatic and food conditions, for the indications are that in other sections the red-head is enjoying the same increases that can be reported of other species.

*Canvasback.* — The canvasback is an occasional visitor, though from time to time flocks of substantial size are noted. Fewer were seen this season than usual.

*Black Duck.* — The black duck is greatly on the increase. It is breeding in greater numbers than has been the case for years, and seems to stand the winters remarkably well.

*Bluebill.* — The usual flight of bluebills was reported a little heavier than usual in some localities, and a little later in others.

*Scoter.* — Scoters were reported in increasing numbers. This year there has been considerable complaint of the damage done by them to the shellfish beds, especially to scallops.

*Sheldrake.* — The sheldrake are enjoying a relative increase in numbers.

*Geese and Brant.* — The flight of geese all through December, 1919, was very satisfactory, and bore out the promise of the earlier part of the season in that it was a banner year for goose shooting. The spring flight marked the congregating of a more than usual number of geese on our shore. The flight continued under normal conditions. Beginning with the return flight in October, the flight was a sustained one up to the close of the period covered by this report, to wit, November 30. Up to that time more geese had been killed than has been known in this State for many years. The fall flight was very heavy, and the flocks were made up of a larger number of families containing young birds than is usual, indicating that these birds came from the first laid eggs.



*Swan.* — It was reported that a flock of ten swan stayed near the geese decoys at a stand in Duxbury for quite a period of time during one day.

*Statistics of the Gunning Stands.* — The numbers of ducks and geese taken at the stands and the number of decoys used during the past three years are of interest as showing the extent of the flights and the success of the stands.

OPEN SEASON OF —	Number of Stands reported.	Number of Decoy Ducks used.	Number of Decoy Geese used.	Number of Ducks shot.	Number of Geese shot.
1917, . . . . .	67	2,093	1,793	3,495 <sup>1</sup>	726 <sup>1</sup>
1918, . . . . .	53	2,112 <sup>2</sup>	2,452 <sup>2</sup>	5,349 <sup>2</sup>	2,065 <sup>2</sup>
1919, . . . . .	74	5,133	4,462	8,322	2,458

<sup>1</sup> Data for 51 of the 67 stands operated. No figures available for the other 16.

<sup>2</sup> Data for 52 of the 53 stands operated. No figures available for the other one.

This year, for the first time since 1906, the use of live goose decoys was permissible in Nantucket County, as the result of legislation (chapter 273, Acts of 1920).

*Migratory Bird Law.* — On April 19, 1920, the Supreme Court of the United States handed down a decision sustaining the validity of the treaty between the United States and Great Britain, and establishing the constitutionality of the migratory bird treaty act enacted to carry out the provisions of the treaty. With its status established beyond the possibility of further question, the full benefits of the Federal law may now be reaped. The Advisory Committee to the Department of Agriculture on the Migratory Bird Treaty Act was called together at Washington, D. C., on June 21 and continued in session two days. The Director of the Division continues as a member of the Board.

*Lighthouses versus Migratory Birds.* — Out of 44 lighthouses from which reports were received, 8 reported birds killed. These are: Cape Poge Light, Edgartown, 4 gulls and 1 black duck; Duxbury Pier Light, Plymouth, 2 marsh hens; Long Point Light, Provincetown, 1 black duck and 1 sheldrake; Minots Ledge Light, Cohasset, 25 small land birds; Monomoy Point Light, Chatham, 1 white-winged coot, 1 eider duck, 1 surf scoter; Nauset Beach Light, North Eastham, 1 black duck;



Sandy Neck Light, Barnstable, 1 gray coot, 15 flycatchers, 2 sparrows; Tarpaulin Cove Light, Tarpaulin Cove, 20 black ducks, frozen.

*Migratory Non-Game Birds — Gulls and Terns.*

Each year a considerable destruction of eggs and young occurs at the breeding places of the gulls and terns, due to summer visitors, children and collectors. This year cloth signs, posted on all such breeding grounds whether extensive or small in area, called attention to the fact that gulls and terns (and, indeed, all breeding birds) are protected by law.

It may be said that unquestionably the terns are increasing year by year, and numerous large breeding colonies and innumerable small ones are scattered along the coast wherever a locality offers favorable conditions. For the larger colonies at Monomoy, Chatham, Nauset Harbor, Katama Beach, and this year for the first time on Muskeget Island, caretakers were appointed during the breeding season.

*Wilson's or Common Terns.* — In spite of a certain amount of mortality due to the elements, the breeding season was a satisfactory one. On June 18 a heavy gale occurred, the accompanying extremely high tide flooded the beach at Chatham, and not a nest remained on the north beach where a few days before 1,000 eggs had been counted. The eggs were found next day piled in windrows at high-water mark. Some of the birds laid again and these eggs were destroyed by a high tide July 9; but the greater number of birds left the north beach after the first disaster and laid second litters on the south beach, — a more favorable location, free from vermin, undisturbed by man, and less exposed to storms. Aside from the loss of eggs (and these were replaced) the mortality was slight.

The storm of June 18 devastated the Monomoy colony likewise, covering the eggs with sand and washing them out of the lowest nests. None were lost, only buried or set afloat. Next day the caretaker, noticing the birds attempting to dig out their eggs, collected and placed on high ground 1,200 eggs, which were rolled by the birds into nests which they had formed near by. Some birds appropriated six of the salvaged eggs. The rescued eggs were watched carefully, and they ap-

peared to hatch as well as those which had been undisturbed. In the nests of 6 eggs only 4 matured.

The colony at Orleans also suffered from the storm, and the birds which hatched were from the second laying.

*Roseate and Arctic Terns.* — The roseate and Arctic terns are rapidly establishing themselves; 200 pairs of Arctics nested at Chatham, and as many more at Monomoy. Roseate terns in numbers exceeding the previous year (probably 100 pairs) reared young on the south beach at Chatham, and 200 pairs did likewise at Monomoy.

*Least Terns.* — Least terns are establishing themselves wherever suitable locations offer. Some 30 pairs bred on the Duxbury beach, but were broken up by the gale of June 16 to 18, and pairs and single birds were seen thereabouts all summer. The entire stretch of the south shore of Marthas Vineyard may be regarded as one great breeding ground, with small groups of nests of both common and least terns in every suitable location. Fairly large colonies of least terns are at Katama (101 nests this year); 50 pairs, more than ever before, at Watcha Pond; 34 nests at Oyster Pond; and innumerable small groups.

*Laughing Gulls.* — Laughing gulls, once near complete extinction, breed in great numbers on Muskeget Island, and though the breeding is confined to this locality thus far, they are seen commonly around the shores of Nantucket, Marthas Vineyard and the mainland. The season was a normal one, and though July 3 brought a heavy rain, no great loss of the newly hatched birds was apparent.

#### UPLAND GAME.

##### *Pheasants.*

The spring breeding season was a favorable one, and the conditions which prevailed throughout the year were good. Despite the fact that the stockings throughout the State were nearly double those of previous years, the complaint was that the birds were wary and in some localities scarce. The excessive dryness of the early part of the season undoubtedly had a great deal to do with the difficulty in finding the birds. It

is found that the birds are becoming more difficult to pursue as the years go on and the annual open season is maintained.

Pursuant to the authority contained in chapter 401, Acts of 1914, an open season on pheasants was declared by the Department from Oct. 20 to Nov. 20, 1920, in all counties except Dukes; limit, 2 in one day, 6 in a season; killing to be reported in writing within twenty-four hours, stating date, town in which killed, number and sex of the birds. The number reported killed in 1920 is 529 less than in 1919, the greatest falling off being in Middlesex (339 less) and Norfolk (110 less) counties.

*Pheasants reported shot in Open Season of 1920.*

COUNTY.	Cocks.	Hens.	Total.
Barnstable, . . . . .	10	7	17
Berkshire, . . . . .	22	12	34
Bristol, . . . . .	83	38	121
Essex, . . . . .	153	108	261
Franklin, . . . . .	34	17	51
Hampden, . . . . .	89	41	130
Hampshire, . . . . .	77	55	132
Middlesex, . . . . .	311	205	516
Nantucket, . . . . .	96	59	155
Norfolk, . . . . .	122	97	219
Plymouth, . . . . .	79	34	113
Suffolk, . . . . .	5	2	7
Worcester, . . . . .	142	76	218
Locality not reported, . . . . .	2	1	3
Totals, . . . . .	1,225	752	1,977

We are of the opinion that, owing to carelessness and indifference, and in many instances a willful holding back of information, not more than 20 per cent of the birds killed in the State were reported this year.

*Summary of Statistics of Open Seasons on Pheasants (each covering One Month) since the Opening of the Season in 1914.*

[Dates of open season, 1914, 1915, 1916, October 12 to November 12; 1917, 1918, November 1 to November 30; 1919, 1920, October 20 to November 20.]

COUNTY.	1914.	1915.	1916.	1917.	1918.	1919.	1920.
Barnstable, . . . . .	31	16	16	Closed	Closed	7	17
Berkshire, . . . . .	477	338	103	60	27	17	34
Bristol, . . . . .	Closed	Closed	Closed	245	196	184	121
Dukes, . . . . .	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Essex, . . . . .	2,583	1,460	845	499	308	271	261
Franklin, . . . . .	Closed	Closed	Closed	38	38	54	51
Hampden, . . . . .	467	254	196	166	133	174	130
Hampshire, . . . . .	Closed	Closed	Closed	195	161	188	132
Middlesex, . . . . .	2,832	1,916	1,054	803	510	855	516
Nantucket, . . . . .	Closed	Closed	Closed	Closed	Closed	144	155
Norfolk, . . . . .	655	628	365	280	191	329	219
Plymouth, . . . . .	Closed	Closed	Closed	182	185	124	113
Suffolk, . . . . .	Closed	Closed	Closed	6	9	5	7
Worcester, . . . . .	1,898	1,229	554	298	158	151	218
Locality not reported, . . . . .	—	—	—	—	7	3	3
Totals, . . . . .	8,943	5,841	3,133	2,772	1,923	2,506	1,977

It may be mentioned as a matter of interest that in 1906 and 1907 there was an open season on male Mongolian, English and Golden pheasants during the open season for quail (chapter 482, Acts of 1906). No statistics were kept. Thereafter the season was closed (chapter 477, Acts of 1908) and not re-opened until 1914.

*Ruffed Grouse.*

The close season on grouse, provided by chapter 153, General Acts of 1919, would expire on Oct. 20, 1920, unless extended by the General Court of that year. On Dec. 3, 1919, the recommendations for legislation were filed. Until such time as the facts could be ascertained, a closed season for a further period of three years on ruffed grouse was recommended. The legislative hearing occurred on March 11, 1920. Prior to the hearing over fifteen hundred questionnaires were sent by the Division to the sportsmen's associations and to individuals in all cities and



towns in order to discover the conditions. Following is a summary of the reports and the decision as to how the matter should be handled.

COUNTY.	Scarce.	Unusual Numbers.	More Plentiful.	Favor Open Season.	Oppose Open Season.	Favor Open Season if Breeding Season is Poor.	Oppose Open Season if Breeding Season is Poor.	Favor Conservation Commission determining Season.	Oppose Conservation Commission determining Season.
Barnstable, .	24	10	13	15	30	13	34	37	6
Berkshire, .	49	17	22	30	46	13	73	60	17
Bristol, .	24	13	15	27	28	6	49	54	2
Dukes, .	5	1	—	—	4	—	4	4	1
Essex, .	60	11	9	5	76	2	80	60	6
Franklin, .	31	17	9	13	37	5	44	35	9
Hampden, .	30	10	13	13	33	1	47	36	5
Hampshire, .	30	20	17	20	40	9	57	56	5
Middlesex, .	76	20	23	14	97	8	103	109	9
Nantucket, .	5	1	—	—	2	—	2	2	—
Norfolk, .	61	24	16	23	74	11	85	83	6
Plymouth, .	38	40	33	46	51	4	87	84	11
Worcester, .	118	25	16	26	127	7	149	136	11
Totals, .	552	209	186	232	645	79	814	756	88

On the basis of the foregoing the Committee on Fisheries and Game was advised to authorize the officers of the Division to determine whether or not there should be an open season as based on similar reports to be obtained in the fall of 1920, but that if a decision must be made at the time of the hearing, based on the information at hand, a further closed season of one year was advised. The committee took no action and thus the season opened automatically in the fall of 1920.

The breeding season of the grouse was favorable and throughout the summer substantial broods were reported in many sections. With the opening of the shooting season the birds were reported plentiful in some localities, especially in southeastern Massachusetts and in the four western counties.

Not having the entire field under trained observers, the best that can be said is that there were undoubtedly localities in which the birds were present in normal numbers, — normal

meaning broods as large as have been observed at any time during the past ten years. In many other localities the birds were scarce. While opinions differ very widely as to the number of birds, it is generally agreed that a substantial brood stock remained at the close of the shooting season, and, if the conditions throughout the winter and the coming season are favorable, that the birds should gradually increase throughout their entire range.

### *Quail.*

The record of the quail for the past season is a sad one to relate for the severe winter took a terrible toll from the quail throughout its range. While there are a few birds west of Boston and as far west as Worcester, the natural range for the quail is the land south and southeast of Boston. Throughout the entire range great efforts were made to see that as many flocks were fed as could be reached. City and town officials, civic societies, girl and boy scout troops, rural mail carriers, sportsmen's associations and many individuals contributed either in funds or from their time toward carrying on this work. Despite these efforts the loss was very great. It will take several years of favorable conditions to restore the birds to the numbers of the fall of 1919.

There are quail in other parts of the State, notably in Middlesex and Worcester counties, and occasionally in the four western counties birds are reported that survive the winter where all of the conditions are adverse. It is significant, however, that in the four western counties only this fragment exists year after year. In Middlesex and Worcester counties there is some prospect that the birds will re-establish themselves. It is a mystery why the quail do not return to Essex County, which for many years was well populated.

The breeding season this year in the State was favorable; and while during the shooting season quail were reported scarce, there will be a sufficient brood stock left, provided the winter of 1920-21 is favorable and a good breeding season follows.

*Carolina Doves.*

It is gratifying to note that more Carolina doves were observed in the various parts of the State than for a number of years.

*Deer.*

The deer, in common with all wild life, showed the effects of the winter. Numerous cases occurred where deer were chased by dogs, from which they were unable to escape on account of the deep snows. This was particularly the case in the western section of the State. The deer came to the breeding season in rather poor condition. Nevertheless it seems to have been good, though reports came to us in the spring and summer that in places where deer had been fairly numerous they had disappeared, either killed off or moved to other sections. The lateness of the foliage deceived many into the belief that there were not many deer in the woods, but the results of the open season in December, 1920 (within the next fiscal year and therefore to be recorded in the 1921 report), showed that there must have been an excellent increase. Not so many were killed as usual by farmers for damage to crops. The amount paid by the State for claims for damage by deer was \$5,577.40.

*Record of Deer shot in Open Season of 1919, December 1 to December 6, Inclusive (within the Fiscal Year 1920).<sup>1</sup>*

	BARNSTABLE.		BERKSHIRE.		BRISTOL.		DUKES.		ESSEX.		FRANKLIN.		HAMPDEN.	
	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.
December 1, . . . . .	12	6	27	9	4	3	-	-	3	3	31	26	26	9
December 2, . . . . .	3	5	16	16	-	5	-	-	1	2	13	15	9	8
December 3, . . . . .	1	-	10	8	4	-	-	-	-	-	12	5	6	8
December 4, . . . . .	3	1	9	5	2	1	-	-	4	1	9	10	4	3
December 5, . . . . .	2	4	8	11	1	-	-	-	-	2	8	6	2	9
December 6, . . . . .	7	11	18	14	2	3	-	-	2	1	9	13	19	7
Totals, . . . . .	28	27	88	63	13	12	-	-	10	9	82	75	66	44

<sup>1</sup> Open in all counties except Suffolk.



*Record of Deer shot in Open Season of 1919, December 1 to December 6, Inclusive (within the Fiscal Year 1920) <sup>1</sup> — Concluded.*

	HAMPSHIRE.		MIDDLESEX.		NANTUCKET.		NORFOLK.		PLYMOUTH.		WORCESTER.		TOTAL FOR STATE.		
	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Total.
December 1, . . .	19	15	3	-	-	-	1	-	14	8	37	22	177	101	278
December 2, . . .	9	4	1	-	-	-	-	-	7	-	10	11	69	66	135
December 3, . . .	10	7	-	-	-	-	1	1	3	2	7	6	54	37	91
December 4, . . .	8	2	1	-	-	-	-	-	-	2	5	3	45	28	73
December 5, . . .	8	2	1	-	-	-	3	-	1	4	11	6	45	44	89
December 6, . . .	9	8	3	4	-	-	-	1	8	9	7	12	84	83	167
Totals, . . .	63	38	9	4	-	-	5	2	33	25	77	60	474	359	833

<sup>1</sup> Open in all counties except Suffolk.

*Deer shot in Open Season in Massachusetts Yearly since the Opening of the Season in 1910.*

[From 1910 to 1916, inclusive, the open season was from sunrise of the third Monday in November to sunset of the following Saturday. Beginning with 1917 it has been from sunrise of the first Monday in December to sunset of the following Saturday. Shot guns only to be used.]

COUNTY.	1910.	1911.	1912.	1913.	1914.	1915.	1916.	1917.	1918.	1919.
Barnstable, . .	Closed	Closed	Closed	31	33	28	43	25	34	55
Berkshire, . .	225	230	182	248	231	205	186	198	163	151
Bristol, . . .	Closed	Closed	81	53	32	45	25	21	26	25
Dukes, . . . .	Closed	Closed	Closed	—	—	3	2	—	1	—
Essex, . . . .	Closed	Closed	68	37	12	14	24	15	7	19
Franklin, . . .	290	282	203	227	242	204	182	229	195	157
Hampden, . . .	231	214	179	242	194	151	164	153	111	110
Hampshire, . .	200	209	184	266	226	168	153	125	111	101
Middlesex, . .	Closed	Closed	88	77	40	42	24	32	26	13
Nantucket, . .	Closed	Closed	Closed	—	—	—	—	—	—	—
Norfolk, . . .	Closed	Closed	Closed	23	16	7	15	5	8	7
Plymouth, . . .	Closed	Closed	Closed	78	48	56	63	40	49	58
Suffolk, . . . .	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed	Closed
Worcester, . . .	436	333	246	305	238	179	170	174	101	137
Totals, . . . .	1,382	1,268	1,231	1,587	1,312	1,102	1,051	1,017	832	833

*Squirrels.*

The scarcity of gray squirrels continues and in many localities they are rare. The cause has never been determined. Probably there is no other animal more dependent on the preservation of the forests than the gray squirrel, and the gradual destruction of the timber vitally affects their range.

*Hares and Rabbits.*

In no locality was the cottontail reported in great abundance. In some localities it is very scarce, — so much so that requests have been received to restock certain covers. Again it should be pointed out that as large areas are deforested, growing up to scrub oak and being generally neglected, those areas become especially favorable for these animals.

Considerable speculation has existed for years as to the rab-

bit or hare on Nantucket, which has been reported as larger than the common cottontail. Efforts have been made to discover the circumstances under which the animal was placed on the island, but no records have been discovered. A specimen was sent to the American Museum of Natural History for identification, and was reported as having been identified by Mr. H. E. Anthony as *Sylvilagus floridanus mallurus*, — the northern sub-species of the Florida cottontail. Nantucket is about the northern limit of its range. It is larger than the cottontail, resembling more the northern hare, but it does not change its coat. It has proved very satisfactory for sporting purposes. In the spring an effort was made to trap some specimens for liberation on Marthas Vineyard. Owing to the work being started late in the spring only 21 were taken; 4 escaped or died and 17 were transferred to Marthas Vineyard. The work will be continued if it meets with success and the hares do no unusual damage.

The experiment of liberating Belgian hare bucks on Marthas Vineyard did not produce any results observable this fall.

A further experiment was attempted in the liberation on Marthas Vineyard of a number of black-tailed jack rabbits, on the advice of the Payne & Crow Animal Company of Wichita, Kans., that they considered this rabbit suitable for such country. Out of a shipment of 50 only 20 survived. One or two were seen in the summer, but up to November 30 there was no indication that they had bred or established themselves.

The coney rabbit was given additional protection by closing the season on January 31, thus shortening the time in which it may be taken by one month, and by the further provision of a bag limit of five in one day.

On the northern varying hare, otherwise known as Canada hare, as snowshoe rabbit and as white rabbit, a closed season until 1923 was established in Dukes, Nantucket, Barnstable and Norfolk counties, and on these same hares a daily bag limit of two in a day was provided elsewhere in the State. The distribution of white hares was on a larger scale than previously, as the demand for them is very great, 1,004 being shipped from Maine direct to applicants. In certain localities



the white hare seems to be more than holding its own. Though a substantial number have been liberated annually on Marthas Vineyard during the past few years there is no evidence that they are establishing themselves. This is a region of comparatively limited snows, and the white-coated animal is an attractive mark for vermin. Should the reports for this season continue unfavorable the distributions will probably be discontinued.

#### FUR-BEARING ANIMALS.

With the rapid decrease in the supply of pelts in the United States (raw-fur buyers representing all parts of the country place the decrease at from 25 to 50 per cent in the last ten years) the local fur industries have become valuable assets, and with the decrease of furs from the great trapping grounds of the north, local supplies are being drawn on more heavily. There is a general protest from raw-fur buyers against traffic in unprime skins, and the losses by killing fur animals when their skins are not in proper conditions is enormous. In Massachusetts prior to 1920 fur animals (excepting raccoons) could be indiscriminately taken at all seasons of the year. As a result of recommendations filed by the Division, chapter 437, Acts of 1920, provides closed seasons as follows: on mink, otter and skunk, March 1 to October 31; on raccoon, March 1 to September 30; on muskrat, March 1 to 31 and May 1 to October 31.

The excessive trapping of the muskrat has so reduced the stock throughout the State that nothing short of drastic measures is likely to bring back this valuable asset. To narrow down the trapper's field of operations, and to protect hunting dogs and the dogs of landowners generally, restrictive measures were enacted in chapter 437 above referred to. The taking of the fur should be considered a business proposition, and means devised to center it in the hands of responsible persons. The best solution seems to be the provision of a trapper's license with a sufficiently high fee to eliminate all but those who will make it a business properly conducted. In Massachusetts muskrats and fox were taken in 1920 in far less numbers than in the previous year, due, first, to the lesser numbers in the State (the stock having been depleted during

the period of high prices), and, secondly, because the lower prices offered less incentive to engage in the business. In the spring of 1920 as high as \$5 was paid for muskrat, and \$25 for fox, against \$1.10 for muskrat and \$12 for fox in the fall and winter of 1920. Owing to the operation of the new law prohibiting early trapping, the muskrat skins were of better quality than formerly, but on account of the warm weather which prevailed in the fall fox skins were below normal in quality.

#### ENEMIES TO GAME.

##### *Cats.*

Little can be added to the previous statements concerning the wild hunting house cat, except to say that the depredations continue, and there is no indication that the animals are on the decrease. Undoubtedly a number were taken by trappers during the time when high prices prevailed on fur, but no systematic effort is being made to reduce the numbers now in the covers and to strike at the root of the evil by removing the conditions under which the wild supply is constantly being augmented.

The annual poster has been displayed in public places throughout the Commonwealth.

*The Commonwealth of Massachusetts*

DEPARTMENT OF CONSERVATION

DIVISION OF FISHERIES AND GAME

# CATS

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Once more the breeding season of the birds has arrived. Those of our resident birds which have survived one of the severest winters of the past generation need all the protection we can give them. The migratory birds should have equal consideration in order that we may keep faith with Canada under our migratory bird treaty, and with our kinsmen in the South who have protected them in the wintering zone.

The greatest single living agency in the destruction of the birds is the roaming, unrestrained house cat. We appreciate the practical difficulties connected with keeping cats under close restraint throughout the entire year, but if every owner of a cat will keep it under restraint during the period from May 15 to August 15, great mortality among our birds will be avoided.

We ask you to make it certain that your cat is so controlled, and that you co-operate with your local officials and societies organized for the purpose to see that all homeless and wild hunting cats are humanely killed.

DEPARTMENT OF CONSERVATION,  
Division of Fisheries and Game.

May, 1920.



A great benefit will be derived when the owners of house cats will systematically keep them under control at all times during the nesting period of the birds, which extends from May 15 to August 15. It is a sad commentary on the whole situation that much money and effort is spent each year to restock our covers, while at the same time this great menace to the animal and bird life is allowed to thrive practically unrestricted. There is no intention of criticizing the landowner who feels that he must have cats about his premises for the protection of his property, but the owner of any cat should be willing to keep it under restraint during the above-named period. The licensing of cats will automatically eliminate a great many which to-day are useless, and would give the cat a standing as property which to-day it does not have.

#### *Lynx.*

A female bay lynx, weighing about 30 pounds and measuring  $4\frac{1}{2}$  feet in length, was killed on November 12 by R. D. Sanders, of Peabody, in that locality.

#### *Fox.*

With the increased price of furs the number of foxes throughout the State has been so reduced that in localities where they were formerly reported plentiful they are now on the verge of extinction. In all probability it will be some years before the number will be so large as to make the fox an important factor in the annual inroads on the wild life of the State.

#### *Starlings.*

There is no question but that the starling is increasing, and it is only a question of time when, on account of its destructive qualities, it will have to be dealt with along with the English sparrow.

#### *Hawks, Owls and Vermin.*

The reports indicate a pronounced increase in the number of red shoulder hawks and Cooper's hawks. One reliable observer tells us that out of 200 nests of red shoulder hawks that he has examined, he found evidence this year for the first time

that these hawks ate game birds. He reports finding the wings and feathers of a quail on the ground below a nest. There was nothing to indicate an unusual visitation of goshawks.

#### RESERVATIONS.

##### *Marthas Vineyard Reservation.*

The routine at the heath hen reservation is much the same year by year. No untoward happenings marked 1920. Patrol work, with the hunting of hawks and cats, made up the daily routine for December and January. The weather was more than usually inclement, cold, windy and penetrating, with either snow or the promise of it all through January. During February quail were fed nearly every day, mostly on foot, owing to the condition of the roads. Many of the flocks fed were 5 miles from the reservation houses. March brought thaws and the season of mud, when oftentimes the roads in certain places were rivers 2 or 3 feet deep. Not much patrol work was done, for the law forbade the hunting of rabbits, and travel was equally as difficult for hunters as for the superintendent. The middle of April repairs on buildings were made, and clearing up work done preparatory for plowing and planting.

*Cultivation of Land.* — Fifteen acres were seeded to new hay land, and 15 tons of hay cut from last year's and older seeded ground. The corn yield was sufficient to meet the requirements of the heath hen and the stock until early spring. As usual, corn, sunflower plants (a hundred or more) and buckwheat (one-half acre) were left standing for feed and shelter of the heath hen. In 1919 seven acres of buckwheat were planted, to give the heath hens as much of this sort of food as they would use; but the larger area did not draw appreciably greater numbers than had the smaller patches of previous years, and only a portion of it was eaten. The heath hens prefer variety in their food, and travel about seeking what appeals to them. They favor the bayberry, and strip the bushes clean before spring. It has been noticed that where flocks have established themselves in other portions of the island it is almost invariably where this food is plentiful. Examination of the

crop of a heath hen found some years ago (killed by an owl) disclosed the fact that it was round and hard as a baseball, and filled with nothing but bayberries. There was only one complaint of damage this year, and it is apparent that what damage they do to crops is only occasional. As a test, the superintendent planted beans on the crest of the hill, in the very center of their feeding ground, and throughout the season they were untouched.

*Heath Hen.* — In the spring the heath hen fed on the hill on good days, from 45 to 50 birds being seen together. It is obviously impossible to make an accurate census of any wild species, but the superintendent is satisfied that there are at least 600 heath hen on Marthas Vineyard. They are fairly well localized on the reservation, and in other known places on the island, and the sum of the various flocks seen repeatedly in definite localities can be taken as a reasonably accurate census. Certain it is that the birds are steadily regaining their lost ground.

*Breeding Season.* — The heath hen began to boom March 8, indicating the approach of the mating season. While the weather during the breeding season was none too good, with much dampness and a rainy spell in the middle of the season, it was undoubtedly a successful one. Even with the conditions that prevailed, more heath hen chicks were seen this year than the previous year, and after the rainy season was over broods of 5 and more birds were seen. The chances are that the broods came through the summer with three or four birds, even though some may have been killed by hawks. This all indicates a good addition to the heath hen population. They appear to be a hardy bird, are native here, and apparently able to withstand any weather. Probably the weather has little effect on them, for they successfully survived all inclement weather as well as the vermin of the early days, and not until devastating fires began to be of frequent occurrence (mostly within the last forty years) did the great reduction in their numbers take place.

*Fires.* — There was only one fire on the plain this year, and that not serious. The wind was east and blew it away from the reservation. April, being a wet month, helped to safeguard the situation.



*Vermin.* — The war against vermin is maintained without cessation. The snow made tracking easy for the dogs, and 16 cats were destroyed. Twenty hawks were trapped and shot. Rats, while still too numerous, nevertheless are present in far less numbers since the vigorous warfare that was waged against them in 1919. The year's toll was 129, not counting the many that were killed and buried by the dog on independent hunts.

*Visitors.* — Considering the remoteness of the heath hen reservation, — off the mainland, distant from the towns, and off the beaten lines of travel in the very center of the island, — it is surprising how many people visit it, and how sustained is their interest. During the spring, the visitors are mostly off-island people who come for the express purpose, and often from long distances, to see the mating antics of the heath hen. Certain ones make the trip year after year, and one in particular has made eleven successive visits. This spring there were thirty-five visitors from the mainland. In the summer they come in greater numbers, and are mostly summer residents. To these it is generally a disappointment that none of the features of the ordinary game farm are to be seen, and particularly no birds (for at this time the heath hen are scattered and only to be seen by a fortunate chance); but after hearing the history of the birds and the purpose of the reservation, they go away in many cases with the avowed intention of returning at the proper time to see the mating antics.

#### *Myles Standish State Forest.*

Wild life conditions on the reservation have improved each year since the installation of a permanent caretaker. Pheasants, ruffed grouse and quail have made a marked increase, though there were less than a dozen of either grouse or quail when the reservation was taken up. Pheasants have spread into all suitable covers, and two beavies of quail, fed through the winter, have bred well. Black ducks are quite numerous, and wood ducks are increasing, 25 being counted in one locality.

The breeding of pheasants was continued from a few adult breeders and a limited number of eggs from the Wilbraham Game



Farm. There were 186 reared, 60 of which were distributed to applicants and the remainder released on the reservation; 6 adults were also released. The object was to produce only enough birds to assist in stocking the local covers.

Fifty mallard ducks, 8 pheasants, 26 black ducks (which are known to have reared at least 4 broods totaling 28 young) and 16 wood duck were liberated on the reservation from the State game farms.

Three thousand wild rice plants were planted in the ponds which seemed most suitable, but did not thrive.

The ever-present vermin is a serious menace to the wild life, and any let-up in a vigorous campaign against these injurious species would mean a serious loss to bird life. This year's toll was: —

Red-tail hawks, . . . .	7	Rats, . . . . .	58
Sharp-shinned hawks, . . . .	4	Foxes, . . . . .	18
Great horned owls, . . . .	5	Skunks, . . . . .	23
Marsh hawks, . . . . .	15	Large snapping turtles, . . . .	17
House cats, some very large, . .	11	Weasels, . . . . .	8

The reservation was patrolled early and late, and no violations of law came to the warden's notice.

*Moose Hill Bird Sanctuary.*

Operations at the Moose Hill bird sanctuary in Sharon were continued in conjunction with the Massachusetts Audubon Society. This area is maintained both as a wild life reservation and as a demonstration station where the public may receive instruction in bird protection, or may study the educational exhibits at the farmhouse headquarters or the varied wild life to be found in the fields and woodlands.

Through the press and the Audubon Society bulletin the public has been kept informed of the work and of the opportunities offered for intensive study of nature. More than 2,600 visitors registered at the office during the past year, not only from 133 cities and towns of Massachusetts, but also from 54 localities outside the State. The annual "Bird Day" on May 17 brought 500 people and represented a widespread constituency.

The reservation is constantly patrolled, and but one arrest has been necessary. The classification of the superintendent as a regular paid fish and game warden, and his appointment as special police for the property and as United States deputy game warden has given needed authority. All visitors are requested to register at the sanctuary office before going about the grounds; hence, although many people have wandered about the place, they are to this extent under control.

Feeding the birds has been kept up throughout the entire year. Winter shelters were maintained during the severe winter weather, and over 200 miles were covered on snowshoes by the superintendent and his wife in this bird welfare work the past winter. In spite of the raging storms which were so destructive to bird life in other localities, only one dead bird was found. Many small birds winter in the sanctuary.

Predatory animals have been held in check, and those classified as "vermin" eliminated so far as possible, — 21 vagabond cats, several skunks, a few foxes and raccoons, and several hundred rats having been destroyed during the year. Several goshawks have been noted in the vicinity during the fall.

Experiments in feeding and nesting devices and methods of attracting birds about the home have been continued, also the identification and card-cataloguing of wild life, — now covering 700 species, — records of nesting birds, and daily ornithological notes. There have been 127 species of birds recorded, 71 of which have been found during the nesting season.

The sanctuary has been established as a regular station for "bird banding" for the United States Biological Survey.

The nesting season was good, and weather conditions favorable for the rearing of a large percentage of the young. Over 100 nests were under observation. At least 4 pairs of woodcock are believed to have nested within the grounds, pheasants and grouse appear to be plentiful, and a covey of more than 30 quail were observed on one occasion. Black ducks nested along the Beaver Hole Brook in the lower part of the sanctuary, while on the upper slopes and higher ridges such birds as the hairy woodpecker, the hermit thrush and the solitary vireo (the usual breed-

ing ground of these three is farther north than this general locality) were found nesting. Many house wrens, bluebirds and tree swallows were raised in the nesting boxes, and in addition to the 50 or 60 other species of small birds breeding here, several nests of useful hawks and owls were located.

*Reservations under Chapter 410, Acts of 1911.*

During the year the terms of the Great Island Reservation in Yarmouth, the Marshfield Reservation, the Marblehead Reservation and the Andover Reservation expired, and no petitions were received for their re-establishment. No new reservations were made during the year.

On a number of these reservations conditions have been distinctly bettered by the restriction of hunting; on others, the presence of injurious birds and animals in substantial numbers tends to defeat the purposes for which the reservations were established. Obviously the proper action would be destruction of such vermin, but this is precluded by the limited number of wardens. To be sure, chapter 410, acts of 1911, empowers the Division to issue permits for the hunting or trapping of injurious birds or quadrupeds, but such permits may be issued only to owners or occupants of the land. When such owners interest themselves actively in the destruction of vermin, well and good; but when they fail to do so, there is nothing further that the Division may do. A recommendation has been made to the Legislature for the correction of this situation. Game birds were liberated on nearly all of the reservations.

*Sconticut Neck Reservation, Fairhaven.* — The laws are well observed, for it is common knowledge that it is a reservation. The mallard ducks liberated in years past remain, but do not breed, and are slowly decreasing. Native black ducks, flight ducks, and shore birds resort to this reservation, but not in abundance. There are two flocks of quail; and pheasants are doing well.

*Hubbardston Reservation.* — The term for which this reservation was established expired in 1919, and on petition from the owners was renewed for three years from April 14, 1920. This area is showing the results of protection. During the year past wood duck came to the dead waters on the Peters



Hill Brook, and bred; black duck were also on the stream, and on Waite and Cunningham ponds, — which never occurred before the territory was protected. There are some gray squirrels; white hares and coney rabbits are increasing, also grouse. It is estimated that about 20 deer are within the area. Vermin is no more plentiful than on the surrounding lands. There have been no occasions for arrests.

*Millis Reservation.* — This reservation lapsed in 1919, and was renewed for five years from Oct. 29, 1920. During the closed period the increase of game was apparent, especially in the case of quail, pheasants and black ducks.

*Tyngsborough Reservation.* — The term for which this reservation was established having expired on Oct. 1, 1920, on petition of the owners it was renewed for five years from Oct. 20, 1920. Conditions remain about the same and there is little to report. The vermin problem is a serious one, and the conversion of much of the cover into an extension of the golf links of the Vesper Country Club has detracted from the value of the land for game. Being a rather thickly settled area, the cat evil is prominent. Pheasant and grouse are present in fair numbers, but the suitable cover being limited they work out into surrounding areas, and a considerable percentage of them are shot.

*Hingham Reservation.* — The term of this reservation expired Aug. 19, 1920, and petition for its renewal has been presented. Contrary to the practice on reservations of this type, the landowners welcome the public, provided the wild life is not molested. The ground feeding birds were well cared for during the winter by residents and the warden. Grain was supplied by the Division, and Peter Bradley, Esq., furnished in addition many hundred pounds of grain, and instructed his employees to expend as much care on the wild birds as on his live stock. In this work Mr. Alexander Pope, who has been actively interested in establishing and perpetuating the reservation, joined. This area is conspicuously free from vermin. No mink or fox have been seen, and the one weasel found was destroyed. Even the house cats have been reduced to a minimum. An inventory of the wild life in the spring disclosed 128 broods of quail, 1 male ruffed grouse, 13 pheasants,



40 rabbits, abundance of gray squirrel, one wood duck, and 20 mallards. The natural increase of the mallards is kept down by the numbers of turtles in the pond. Migratory birds visit the reservation in great numbers.

*Lynnfield Reservation.* — There was a heavy flight of song and insectivorous birds in the spring, and some, particularly the warbler species, stayed a considerable time. Undoubtedly they found good feeding in the weedy fields. For some reason wild life did not thrive on the reservation this year. The pheasants liberated have been seen occasionally, but the quail have disappeared. A brood of wood ducks was raised on the reservation, but black ducks failed to breed. The mallards did not produce as many young as last year, accounted for by the discovery of two crow nests close by in which were the shells of 71 duck eggs and the wings and feathers of adult birds. Gray squirrels bred in good numbers. Some hawks and crows have been shot by the warden, but the demands of the rest of the district preclude much work on the line. Foxes appear to have been exterminated. As feed for the game birds one-half acre of corn was left standing.

*Taunton Reservation.* — This area is responding to protection and to the constructive work of the landowners. Pheasants have increased so as to be very numerous, and during the past summer have done some little damage to gardens. The same was true of rabbits, of which there are many. No complaints were expressed, only gratification at the increase of wild life. Grouse, while they have increased considerably over last year, are not so numerous as could be wished. Gray squirrels have increased slightly, but hard winters have reduced the quail. Grain was put out systematically during the winter, and brought many of the birds through in fair condition. John Sharp, Esq., has planted a number of fruit-bearing trees and shrubs on his land in the reservation to provide winter feed, and plans to extend this work. During the severe weather foxes became very bold and killed much game, but a campaign of extermination was started and 12 were trapped by the foreman on the Sharp estate.

*Mansfield-Foxborough Reservation.* — Ruffed grouse, quail and pheasants have increased. The district warden's winter feed-

ing work disclosed more quail and pheasants within a radius of 2 miles outside of this reservation than there have been for several years. Frequently there were 150 or 200 black ducks at a time in one of the small ponds. A bushel and a half of grain was planted by the district warden for standing winter feed, one-half in the Foxborough portion and one-half in the Mansfield part of the reservation. The laws have been well observed.

*Bare Hill Reservation, Harvard.* — Conditions here are encouraging for ruffed grouse, gray squirrels show marked increase, and rabbits are more than holding their own in spite of foxes and hawks, which were very numerous during the year. A campaign against predacious species carried on by the district warden and volunteer warden F. V. Pillman of Ayer accounted for 18 skunks, 2 mink, 2 weasels, 10 crows, 25 red squirrels, 5 red shoulder and 6 sharp-shinned hawks. There was no apparent loss among the game by reason of winter conditions.

*Pittsfield Reservation.* — In this area there is a noticeable increase among ruffed grouse. Rabbits are few; deer are frequently seen. There has been no trouble in the past year from trespassers, and but little from vermin except the numerous red squirrels.

*Randolph Reservation.* — This reservation is a wild, heavily wooded tract of about 1,000 acres of uninhabited land adjoining the Blue Hills Reservation, and contains little beyond a few grouse and a fair number of rabbits. There is no cover suitable for quail or pheasants. Though it is a particularly good grouse country, there are only a few birds of this species. Foxes, weasels and mink are numerous, and, in fact, the vermin outnumbers the game. There can be little hope that a reservation will achieve its purpose when, by its nature, it provides ideal conditions for the increase of vermin, unless definite measures are taken to reduce it to a point where the useful game may increase. As already stated, such work, owing to the limited warden service, must be done by the land-owners.

### INLAND FISHERIES.

At the present time the natural increase in the fish life of our lakes and streams, though assisted by artificial propagation, is not keeping pace with the increased fishing, with the exception, perhaps, in the case of the brook trout. The time has come when the situation must be faced and further restrictions placed on the taking, together with more protection during the breeding season. For example, on Jan. 1, 1920, 1,000 pickerel were taken from one of our small ponds (Quannapowitt Lake, Wakefield). On another occasion during the summer of 1920 two men took an average of 75 bass a day for six days from Naukeag Lake, Ashburnham. One of the most popular fish in Massachusetts is the pickerel and it is to be found in nearly all of our great ponds. Artificial propagation of this species has never been adopted. The closed season does not start until March 1. There is no restriction on fishing through the ice, with the result that it is estimated that 95 per cent of the fish taken in the months of January and February are female fish, heavy with spawn. A fisherman may take all he can catch by use of ten traps, and he may sell his fish. There is no pond in the State, and no species of fish in a pond, which will stand this drain under present-day conditions. There will never be any more ponds nor more streams. The number of fishermen will increase. All of these waters are becoming more accessible to fishermen by the improvement of roads and the use of automobiles. The shores of the ponds are being built up rapidly with camps, and the funds available in fish culture are totally inadequate for stocking each one of these ponds annually. And even in those which we do stock, the limited resources prevent the planting of the proper number of fish at a time to get the best results. It requires only the application of sound business judgment to show that there should be a close season on each of our food and game fishes, properly protecting them during the breeding season; only fish of a reasonable length should be taken, and these in a sane and reasonable number per day. Likewise the sale of all species of fish taken from inland waters should be



absolutely prohibited. The time has gone by when individuals should be permitted to exploit these natural resources of the Commonwealth for private gain. During the past most of the work of the Division has been directed to the breeding and distribution of the game fish. It is believed that the common food varieties should have equal attention. To that end the work enumerated has been done with the white perch and horned pout, and an effort is under way to establish the Delaware River catfish.

#### FISHING LICENSE.

The first year's experience with the new fishing license law has demonstrated its value. There were 42,959 licenses issued for fishing, aside from the fishermen who took combination hunting and fishing licenses. The financial benefit to the Commonwealth from straight fishing licenses, after deduction of fees, was \$17,191.65. A table of license statistics appears on page 11.

#### PONDS STOCKED.

Under chapter 285, Acts of 1911, the following ponds were stocked and closed to winter fishing:—

- Muddy Pond, Kingston, regulations expire July 1, 1923.
- Spectacle Pond, Littleton, regulations expire Dec. 1, 1923.
- Fort Pond, Littleton, regulations expire Dec. 1, 1923.
- Nuttings Pond, Billerica, regulations expire Dec. 1, 1923.

During the time the regulations are in force, fishing is permitted in these ponds between June 1 and October 31, inclusive, and in the tributary streams between April 15 and July 31, inclusive. Fishing is allowed only with a hand line, or with a line attached to a rod or pole held in the hand.

The following privately owned ponds were stocked with food fish, on stipulation of the riparian proprietors that they would permit public fishing therein for a term of ten years: Mason's Pond, Rockport, owned by Rockport Granite Company, and Dark Pond, Rockport, owned by Cape Ann Tool Company.

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## TROUT.

*Brook Trout (Salvelinus fontinalis).*

The trout streams were very high throughout the State at the opening of the season, and the water was at the first of it quite cold. The greater number of the streams of substantial size had a good volume of water throughout the entire season, and, while the waters did not warm up rapidly, nevertheless the conditions, taken as a whole, from the beginning to the close of the season, were unusually favorable. It is a great satisfaction to report that this season was even an improvement over the season of 1919 as regards the number taken and the relative size of the fish caught. In many sections where the depleted streams are gradually being brought back, the first good reports for some years were made. The maintenance of the supply of trout is a practical demonstration of what can be done by protection to the species during the spawning season, by restricting the catch, and the maintaining of a limited open season, coupled with artificial propagation.

*Brown Trout (Salmo fario).*

During the past year steps have been taken for resuming the breeding of brown trout pursuant to what appears to be a genuine desire for this fish on the part of anglers, and the physical condition of some of our waters. Progress this year was limited to securing from a private dealer a stock of eggs from which the nucleus of a brood stock was established. In years past, beginning with 1899, brown trout were raised at the State hatcheries and distributed. They are suited particularly for waters where the temperature is too high for brook trout, and thus it is a valuable fish for stocking waters which otherwise might remain barren of fish life. The rearing of the brown trout was discontinued at a time when sentiment ran high for the production of the strictly game species. Though not enjoying the prestige of the brook trout, nevertheless the brown trout is a fish not to be despised, and its lack of popularity is probably due more to reasons of sentiment than from lack of merit. It grows more rapidly, to greater size, and can stand a greater amount of pollution in the water,

and anglers claim that in fighting and edible qualities it equals the brook trout.

In resuming the distribution of brown trout there is no intention whatever of discriminating against the brook trout. Wherever conditions are suitable for brook trout, the latter will be planted and brown trout used only for waters already containing them, or below barriers, like dams, where they would be segregated. But with the progressive deforestation of the Commonwealth, with the attendant rise in temperature of the streams, the increased pollution of rivers, and the constant fishing, more and more of our waters are becoming unsuitable for brook trout. For such, it is believed the brown trout should be used. The rearing of brown trout will in no way curtail the brook trout work at the hatcheries, since the higher temperatured water in which they will be reared would be valueless in brook trout propagation.

Of all the waters previously stocked with brown trout, they have thrived best in the Ware River, the Westfield River and the Konkapot River. Even yet good numbers of brown trout are taken from the middle branch of the Westfield River and its tributaries each year. Two specimens taken in 1920 weighed, respectively, 4 (20 inches) and  $4\frac{1}{4}$  pounds (25 inches); and members of the Boston Fishing Club took from the middle branch of the Westfield River 65 from 10 to  $15\frac{3}{4}$  inches. As an illustration of the size of the brown trout in the middle branch it may be mentioned that in 1917, after four extraordinarily hot days, there were found at the dam at Littleville, where the water was 84 degrees, 37 dead brown trout weighing from 1 to 5 pounds 8 ounces, the largest  $27\frac{1}{2}$  inches in length. This occurred at a time when the river was unusually low. In normal times the fish would have saved themselves by dropping down to cooler water. Such a combination of low water and hot weather would probably not occur for many years.

#### CHINOOK SALMON.

In December of 1919 the Division learned that it would not be possible to obtain a satisfactory supply of Chinook salmon eggs for the hatching work of 1920. Oregon advised that no eggs could be expected; in California egg taking was the

smallest on record; Washington could promise only 200,000 against 600,000 and upwards in other years. This curtailed the 1920 production of Chinook salmon.

Dependence on distant States for the egg supply is an unsatisfactory aspect of the salmon work. The attempt to establish the Pacific salmon in Massachusetts waters was, at the best, an experiment, and, while in the matter of growth some of the fish planted in Long Pond, Plymouth, exceeded expectations, there was insufficient evidence that they reproduced. Indeed, the probability that they would fail to do so was always recognized, and that constant stocking would be the price of whatever salmon fishing our waters might afford.

Thus as each fishing season came around the results were watched with the keenest interest, and more so than ever in 1920, because the catch of 1919 had fallen off materially from that of the previous year. The salmon fishing in Long Pond failed utterly in 1920. Very few were caught at all and the largest weighed but 4 pounds. Mr. Edward Bassett, who resides at the pond and who acted as observer, reported that up to April 21 not more than 15 salmon had been taken, the largest  $1\frac{1}{2}$  pounds. On May 5 he wrote that one boat caught one salmon that weighed 4 pounds, and another,  $1\frac{1}{2}$  pounds; and that since his report of April 21 about 60 had been caught, of which only 12 were of legal length. Results through the entire season were no better.

With regard to the other ponds, the only catches of salmon which we have heard of in 1920 were as follows: In Cliff Pond, Brewster, on May 22 one  $6\frac{1}{4}$  pound female Chinook salmon,  $25\frac{1}{2}$  inches in length, was taken. In Peters Pond, Sandwich, a number of Chinook salmon were caught that weighed from three-quarters to 1 pound; also, one 4-pound and one 5-pound salmon. Report came to us that in December, 1919, one Chinook salmon was caught in Onota Lake, fishing through the ice, and during 1920 one was taken weighing about  $2\frac{1}{2}$  pounds.

With regard to the Merrimack River, according to the known habits of salmon the year 1920 should have seen the return to the Merrimack River of the salmon planted therein in 1916.



In anticipation of this, and in order that any salmon which might appear in the river should be brought to the office for identification, posters explaining how to identify the Chinook salmon, calling attention to the possibility that they would appear in the river, and requesting that specimens be sent to the office at the expense of the Division, were displayed throughout the entire Merrimac valley, and through boards of trade and other organizations were circulated among the commercial fishermen. It is believed that the public in general, and the commercial fishermen in particular, have kept close watch on the situation, but there has been only one rumor, and not one authenticated instance, of their return.

The officials of the Division were thus confronted squarely with the question whether or not to continue the rearing and distribution of Chinook salmon.

A review of the facts showed that since 1914 Chinook salmon had been hatched from eggs received from the Pacific coast, and planted in the deepest, coldest ponds, well stocked with smelt for food. The salmon were planted as 3 to 5 inch fish, and between October 1 and November 15 (that is, after the predatory fish had ceased feeding), when, consequently, the salmon had the greatest chance of survival.

The following table is a résumé of plantings from 1913 (in 1913 a consignment was received from the United States Bureau of Fisheries) to 1920: —



*Chinook Salmon Distributions.*

	1913.	1914.	1915.	1916.	1917.	1918.	1919.	1920.	Total.
Long Pond, Plymouth, . . . . .	-	-	1,000	5,000	20,500	14,000	9,900	10,376	60,776
Lake Garfield, Monterey, . . . . .	-	-	3,500	3,000	10,000	-	-	-	16,500
Big Alum Pond, Sturbridge, . . . . .	-	2,375	4,000	5,000	10,000	1,100	10,000	-	32,475
Long Pond, Wellfleet, . . . . .	-	3,000	2,000	5,000	14,000	-	-	-	24,000
Cliff Pond, Brewster, . . . . .	-	4,625	2,000	5,000	14,000	11,650	5,000	10,495	52,770
Stockbridge Bowl, Stockbridge, . . . . .	-	1,750	2,500	-	9,000	-	-	-	13,250
Onota Lake, Pittsfield, . . . . .	-	3,000	4,000	5,000	11,200	-	9,900	-	33,100
Lake Quinsigamond, Worcester, . . . . .	11,000	16,750	13,500	21,000	27,000	-	-	-	89,250
Peters Pond, Sandwich, . . . . .	-	-	-	-	6,500	11,500	10,200	10,534	38,734
Bloody Pond, Plymouth, . . . . .	-	-	-	-	5,000	10,000	4,100	-	19,100
Neck Pond, Barnstable, . . . . .	-	-	-	-	-	-	3,400	-	3,400
Spectacle Pond, Lancaster, . . . . .	-	-	-	-	-	-	5,160	9,500	14,660
Great Pond, Otis, . . . . .	-	-	-	-	-	-	10,000	-	10,000
Salmon Pits, Rockport, . . . . .	-	-	-	-	-	-	2,000	-	2,000
Norwich Lake, Huntington, . . . . .	-	-	-	-	-	-	5,200	5,000	10,200
Total distributions in ponds, . . . . .	11,000	31,500	32,500	49,000	127,200	48,250	74,860	45,905	420,215
Merrimack River and tributaries, . . . . .	-	-	-	300,000	378,000	360,000	278,500	202,400	1,518,900
Total of plants in ponds and rivers, . . . . .	11,000	31,500	32,500	349,000	505,200	408,250	353,360	248,305	1,439,115

In most of these ponds no salmon at all have ever been taken. In Big Alum Pond, Cliff Pond and Onota Lake a very few specimens have been taken, and in Lake Quinsigamond in the third season possibly 70 fish, after which they disappeared. The only exception is Long Pond, Plymouth, where in the season of 1917 about 100 salmon were caught, the largest weighing 7 pounds; in 1918, probably 350, running from 2 to 9 pounds, with 2 or 3 at 12 pounds; in 1919, about 800, but of small size, from 2 to 4 pounds; and in 1920, very few, the largest 4 pounds. In the Merrimack River the first year's plantings proved a failure.

Viewed as a whole, the results from the work have been meager, considering that it has taken, it is estimated, about 60 per cent of the time and funds at the Palmer fish hatchery.

It was the feeling of the officials of the Division that further efforts along this line are not justified. But, following the practice of consulting the persons most affected before adopting a change of policy of far-reaching importance, questionnaires were sent out to all the fish and game associations and to a large number of individuals, stating the case and putting two specific questions:—

1. Assuming that the funds of the Division for the propagation of fish are so limited that we are *unable* to produce sufficient numbers of food and game fish, which we know will reproduce in our waters, to meet the needs, shall we continue to rear and plant Chinook salmon?
2. In view of the fact that we have the plants of 1917, 1918, 1919 and 1920 still to be heard from in the Merrimack River, shall we make further plants until we know whether any of the above will be successful?

The replies to 93 per cent of the questionnaires advocated the discontinuance of planting salmon in ponds and any further experiments in the Merrimack River. There are still four plantings in the river to be heard from, and should the fish appear in such numbers as to justify the resumption of the work, it will be renewed.

No action was taken under chapter 339, Acts of 1920, empowering the Department of Conservation to make rules and regulations for the taking of salmon.

## PIKE PERCH.

There is nothing of particular moment to record in connection with this species, which has become established in a number of our ponds and in the Connecticut and the Deerfield rivers through the efforts of the Division. It is such a deservedly popular fish that it is to be regretted that finances will not permit handling it on a much larger scale.

Following the usual custom the pike perch eggs for hatching were collected by employees of the Palmer hatchery at the spawning grounds of the pike perch in Vermont. They worked in conjunction with the officials of Vermont, dividing the labor and the eggs. From the 56 quarts of eggs collected there were hatched and distributed 9,750,000 fry.

## PICKEREL.

The thickness of the ice in the winter of 1919-20 virtually acted as a closed season, the effect of which was reflected in the catches of the following summer. "Big catches," "large fish," "larger fish than usual," "exceptionally good fishing" was the word from the majority of the districts. This is an illustration of what may be expected if even a moderate degree of protection is given by shortening the season and limiting the catch. The pickerel problem has already been stated, and the remedy suggested.

There were 600 pickerel, taken in the process of seining horned pouts in Shaker Pond, Ayer, distributed in ponds.

## BLACK BASS.

The past year appears to have been an average good one for bass fishing, varying to excellent in some localities. The closed season should be extended to July 1 in order to protect late spawners, and a catch limit is imperative. It is reported on reliable authority that two men took on an average of 76 bass per day for six consecutive days out of one pond (Naukeag Lake). It is hopeless to attempt to keep pace with such conditions by artificial propagation only.

Small-mouth bass fry for distribution were collected in North Watuppa Lake, Fall River, June 16 to 29, using nets

of very fine material. This is a water supply well stocked with bass which breed prolifically, and the water board which controls it has been most courteous in permitting the seining of fry for distribution and the capture of adults for brood stock. The lake was exceptionally high for the time of year, and the water backing up into the woodland made the fry more than ordinarily difficult to secure. Only eight of the thirteen days were favorable for the work, during which 148,000 fry were collected. The ideal conditions for the taking of fry combine a quiet, sunny day, still water and little or no wind. Shipments were made direct from pond to applicant. On the days unfavorable for taking fry, the crew fished for adult bass for brood stock for the Palmer hatchery; 24 were secured for the Boston Aquarium.

#### WHITE PERCH.

The transfer of white perch from well-stocked to poorly stocked ponds is one of the activities the results of which fully justify the continuance. In many of the waters so stocked fish are showing up, — small sized in the recently stocked waters and good sized in those stocked long enough ago to have permitted growth.

Salvage work was begun April 1 at Tashmoo Pond, Vineyard Haven, with three men and the same gear as the previous season. A new method of setting fyke traps was tried with excellent results. It consisted of adding an 80 by 4 foot center leader to two traps, running the leader from shore and facing the mouth of the trap inshore instead of parallel to the shore of pond, using the wings also to stop fish from going by. These leaders were used on two traps, and two other traps were used as formerly without leaders. The traps with the leaders caught four times as many fish as did the traps without. Two large pockets, 10 by 10 by 6 feet were floated in 20 feet of water, and the fish awaiting shipment kept very well in them. A breakwater 55 feet long and 3 feet deep was built around the holding pockets in shore and gave good results.

Weather conditions during April, being cold and rainy, were most unfavorable for taking fish. The fish were not nearly as plentiful in Tashmoo Pond as formerly, and only the increased facilities for catching made possible the favorable



showing as to numbers taken. Shipping continued without interruption from April 6 until June 5. Better planned messenger service and the use of a new type of pump for aërating the fish in transit were features of the year's work.

In exchange for courtesies extended to the Division, 1,500 adult white perch were shipped to the United States Bureau of Fisheries, and 13,700 to the New Hampshire and 800 to the Vermont fish and game departments; 7,200 were seined for Webster Lake, under the usual arrangement whereby the town of Webster bears the expense of catching and transportation; 89,300 were distributed to other State waters, making a total of 112,500 fish. While numerically this was a decrease from last year, it was proportionally greater as the shipping season was nine days shorter than in 1919. The most pressing need of the salvage section is a 2-ton truck, not only to make it possible to do our own trucking, but for transferring the whole salvage outfit on short notice to any section of the State where fish may be available.

### SMELT.

#### *Salt-water Smelt.*

The natural elements so interfered with the collection of salt-water smelt spawn for hatching that the work was almost a failure. Mild weather prevailed the third week of March, and on the 25th the fish made their first appearance at the falls in the Weir River, Hingham, where the work is carried on. Heavy rains began to fall and the water in the river rose to the freshet mark. The deep, swift-flowing current of water was more than the spawn-loaded fish could navigate, and they appeared content to remain far below the falls, where they deposited their spawn upon the river bottom. Our men soon discovered these unusual conditions, but were not equipped to cope with the situation.

As soon as the water receded to its normal flow, making it possible for the fish to reach the falls with ease, the weather broke, and cold and stormy weather prevailed. The mild weather of April was of brief duration and the water temperatures fluctuated greatly. The spawn in the fish develops only in warm water, and the sudden changes in water temperatures

retarded this development to such an extent that the depositing of spawn was not completed until the middle of May, making the season one of the longest on record. Getting the spawn from the fish was difficult, owing to the large per cent of unripe spawn. The total amount of fish to reach the falls at the Weir River was only about 25 per cent of the normal amount.

Taking the fish by net, as has been the custom of late, was unsatisfactory as the fish ran from 60 to 90 per cent males, and the few females were largely unripe. Picking the fish from the falls with the hands assures the handling of only the fully matured fish of the desired sex, and produces the most fertile spawn, but this method is very slow.

On April 12, 22 quarts of spawn and on April 13, 14 quarts more were collected and shipped to the Palmer hatchery for hatching. Following these shipments the spawn was taken only in small lots, all of which were hatched on the grounds and the fry planted in the stream.

A number of improvements were made at the station, notably piping the hardening house with running water from Foundry Pond. A battery of three hatching jars was in operation throughout the season, in which many tests were made to determine the fertility of the spawn and the improved method of hardening. About 5,000,000 fry were hatched in this battery. The use of a boat was given by Mr. Pierce Long of Hingham, who has extended similar courtesies to the law-enforcement section. Aid was also rendered in the electrical work by Mr. Gus Erickson of Hingham.

The excess of water that so materially interfered with the work at the Weir River made the conditions almost perfect at other streams for a heavy natural hatch, for the high water gave the fish access to a larger portion of the brooks and also kept the bottom free from fungus.

#### *Fresh-water Smelt.*

No fresh-water smelt were taken for distribution during the spring run of 1920 at Onota Lake, Pittsfield. The combination of a late breaking up of the ice with high water in the brook retarded the normal spawning season a week or more, and

when the run did come it was very light and lasted only four nights. This year for the first time residents of the Commonwealth were permitted to capture landlocked smelt for food and bait, as authorized by chapter 57, General Acts of 1919. Substantial amounts were thus captured, under supervision of the wardens, from Laurel Lake, Lee, and Onota Lake, Pittsfield.

### HORNED POUT.

The best that can be said for horned pout fishing this year is that it was "fair," with reports of ponds becoming depleted and stock running small. The horned pout, as well as the other food fishes, needs relief from the drain of overfishing. As a further assistance (though this will be of less effect than season and bag limits) the Division plans, as fast as may be, to acquire suitable small ponds in different parts of the State to serve as brood ponds, from which each year the natural increase can be collected and distributed. Shaker Mill Pond in Ayer has been secured for three years, and after screening the inlet and outlet 200 large breeding horned pouts from a pond on the Hubbardston reservation were introduced, and 100 young were removed in the fall and distributed.

### GRANTING OF FISHING PRIVILEGES IN GREAT PONDS.

#### *Lease of Chilmark Pond.*

After a public hearing held at West Tisbury on Oct. 5, 1919, Chilmark Pond in Dukes County was leased, pursuant to chapter 81, Acts of 1896, to certain of the riparian proprietors for five years from March 1, 1920, at an annual rental of \$75.

#### *Permits to seine Squibnocket Pond.*

No permits were issued for seining Squibnocket Pond as provided by chapter 124, Special Acts of 1917, though applications for such were received from two residents of Gay Head. The petitions were filed so late that fishing could not start before the first of May. Experience in other years had shown that from May 1 until the last sets were made about the middle of June, the grass, which is very abundant in the pond, interfered



materially with seining; and the presence of other fish, especially alewives, so complicated the work that little profit was derived from it.

*Lease of Bartlett's Marsh Pond and White Island Pond.*

The Legislature of 1919 by a special act, chapter 201, authorized the board of commissioners on fisheries and game to lease Bartlett's Marsh Pond in Wareham and that portion of White Island Pond lying in Wareham for the artificial propagation of alewives. A hearing on one petition was given, but no action has been taken.

SCREENS.

In previous reports the futility has been dwelt on of placing fish of migratory habits in ponds the outlets of which are not screened. Funds have never been provided for this necessary work, and such screening as has been done has been the work of public-spirited individuals or fish and game clubs.

Chapter 382, Acts of 1920, empowered the Commissioner of Conservation to expend such sums as the General Court may appropriate from time to time for the screening of ponds and rivers. Activities along this line will, of course, be controlled entirely by the action of future Legislatures in providing the funds.

The Congamond Association, having studied the conditions in the Congamond Lakes and found that notwithstanding extensive stockings for the past ten years fishing grew steadily poorer, installed a wrought-iron screen at an expense of \$200. Each year some public-spirited individual or association comes forward in this way, and the whole public benefits.

FISHWAYS.

Work leading to the installation of fishways at those dams on producing or potential alewife streams, where their presence is deemed necessary, was pursued as continuously throughout the year as pressure of other work would permit. Unfortunately, owing to extreme scarcity of cement and the prohibitive prices which prevailed for this product during the greater part of the most favorable season for carrying on con-



struction work, only three fishways — those located at the dams of the Essex Company of Lawrence, the Ipswich Mills of Ipswich, and the Carver Cotton Gin Company of East Bridgewater — were carried to a state of actual completion, but much progress was made in the way of all essential engineering and other work preliminary thereto.

*Town, Satucket and Nemasket Rivers.*

By way of following up locations already surveyed, the matter was again taken up with the Easton Investment Company of West Bridgewater, the Carver Cotton Gin Company of East Bridgewater, the Nemasket Worsted Mills of Middleborough, and Benjamin Cummings, owner of a dam at Russells Mills, Dartmouth, all of whom agreed to take such action in the premises as will lead to construction of fishways at their dams in the near future.

Owing to alleged difficulty of installation of the type of way planned for the dams of the Carver Cotton Gin Company and the Easton Investment Company, a re-examination was made of their locations, as a result of which some of the features of the old ones considered to be undesirable were modified. Much to the gratification of all concerned, the fishway called for at the former location was fully completed in the month of October. This, though of unique construction, embodies in the main the principles of our standard "straight-run" fishway.

*Saugus River.*

Investigation of the present condition of the Saugus River showed it to be obstructed at three points in its course by dams, situated respectively on the property of the Cellulograph Engineering Corporation of Boston, formerly owned by Wallace Nutting, and the United States Worsted Company, in Saugus, and at the dam on property at Montrose under the control of the Lynn Water Board. At the two first mentioned locations, wooden fishways have existed in a bad state of repair up to and including last season, but these have reached such an advanced stage of decay that they are of no further use. Thus, since a fishery still exists in this stream, it becomes imperative that these structures be replaced without delay.

When the proposition was broached to the parties in question, it was accepted in a not unfriendly fashion, and action is expected in the near future. Preliminary surveys have already been made of both of these locations.

Investigation of the situation at the dam at Montrose revealed the fact that the city of Lynn's flowage rights over adjacent meadow land above the dam are not good between April 1 and October 20, which necessitates its gate being left open during this time. Therefore the matter resolves itself into the question of whether or not the force of water through the gate opening would be so great as to effectually prevent the passage of fish through it. With regard thereto, it would seem that at its maximum height there is only a 7-foot drop at the dam, which, in the course of one or two weeks, settles down to not more than 3 to 4 feet, the capacity of the bed of the stream. Therefore, though the gate is so constructed as to lift up from the bottom, it must be taken for granted that the pressure exerted by the volume of water last mentioned will not subject the fish to such unfavorable conditions as will make it impossible for them to pass. Should it be demonstrated to us, at the time of the first run of fish up as far as this point on the stream, that these conclusions are wrong, the Lynn Water Board has agreed to comply with whatever requirements the Division prescribes with regard to the matter.

#### *Ipswich River.*

The Ipswich River presented a like number of obstructions to the passage of fish in the form of dams located on the property of the Ipswich Mills, Ipswich, of W. F. Barrett of Hamilton, and of C. G. Rice of Ipswich. At the first of these a "straight-run" fishway was constructed by the end of November. Surveys were likewise made of the two other locations in order to provide the owners with suitable fishway plans.

#### *Merrimack River.*

Upon suspension of work on the Lawrence fishway last year, the uncompleted portion consisted of the lower end where the plans indicated the lowest elevation of any part of the structure. This was to connect the completed portion with the channel of the river through which the fish would pass. Owing



Fishway at dam of Essex Company, Lawrence, Mass., completed Nov. 19, 1920. Showing top of fishway.



Fishway at dam of Essex Company, Lawrence, Mass. Showing lower end of fishway.





to the depth of excavation and low elevation required, this portion could not be completed until a low stage of water occurred in the river, unless with the great expense of a cofferdam. In view of the high water in spring and early summer the river did not reach a low stage until a period which extended much longer than usual, and with further labor troubles and the difficulty in obtaining necessary supplies work was much delayed after starting at the late date of August 2. The structure was entirely completed by Nov. 19, 1920, after a total of 156 working days during 1919 and 110 in 1920, making a total of 226 working days from the date of commencement.

No disbursements were made in 1920 from appropriations made for this work, except payments on the contract, and \$1.47 for blue print in connection with the Lowell fishway. An advancement of \$424.70, made by the Essex Company in March as a portion of their promised contribution of \$2,500, defrayed bills of the engineer for \$187.50 and \$237.20.

Until some species of fish which will use a fishway have been brought up to and over the dam at Lawrence, it is not considered advisable to proceed with work on the fishway at the dam of the Locks and Canals Company at Lowell.

#### POLLUTION.

It was impossible to make more than slight progress on the problem of the effect of water pollution on fish life. Examination and reports have been made by the district wardens and the biologist, covering the following cases. The matter in each instance was brought to the attention of the firm concerned.

NAME.	Location.	Stream.	Pollution Material.
East Weymouth Wool Scouring Company.	East Weymouth, .	Weymouth Back River, .	Alkali.
Chandler Mill Company, .	Marshfield, . . .	South River, . . .	Sawdust.
Union Mill, . . . .	Becket, . . . .	Westfield River, West Branch.	Coal ashes.
Chemical Works, . . .	Woburn, . . . .	Mystic River, . . .	Acid.

The fish life in the Westfield River suffered considerable injury through the accidental discharge of chemicals into the river as the result of a train wreck. On July 19 eight cars of the Boston & Albany Railroad left the track 2 miles east of

Becket station, and four of them, two containing cement and lime and two zinc oxide, plunged down a 15-foot embankment into the river. Between 80 and 100 barrels of zinc oxide, weighing 300 pounds each, were thus spilled, coating the river bottom white, and discoloring the water and exterminating the fish as far down as Westfield.

Water samples collected on August 10 at Chester and Huntington, 9 and 15 miles, respectively, below the point where the wreck occurred, were examined by the State Department of Health, which made report that the condition of the river was normal at the time of taking the samples, in so far as their analysis went. Tests of the hardness of these two samples showed it to be no greater than 3.0 and 2.6 parts in 100,000, which indicated that in this respect the water was not abnormal, and that there was no great quantity of lime present. The further statement was made in this report that as zinc oxide or lithopone is insoluble in water and although the water might have become turbid to the extent of clogging the gills of the fish for the time being, it is a substance which would soon be precipitated to the bottom of the stream, and thereafter not destroy fish. The effect of the soluble lime was naturally quite different, but that it tended to disappear very rapidly is shown by the results of the above-mentioned water analysis.

Experiments to determine the amount of trade waste and chemicals necessary to kill trout directly were undertaken during the summer by the biological department at the East Sandwich hatchery, and some interesting information was obtained regarding the toxic effect of small quantities of common materials.

From time to time questions arise as to the right of riparian owners on great ponds to commit acts which may result in injury to the fish life in the pond, such, for instance, as the treatment of the waters with chemicals for the destruction of algæ. A specific case laid before the Attorney-General brought forth the following ruling:—

It is my opinion that the deliberate deposit of copper sulphate or other poisonous substance in a great pond containing quantities of fish, with knowledge or reasonable expectation of fatal results to the fish therein, may well be a public nuisance and an indictable offence. But, as above indicated, there must be some real injury in order to constitute a nuisance.



## PROPAGATION OF FISH AND GAME.

### GENERAL.

#### *Sale of Abandoned Hatcheries.*

The two fish hatchery properties in Adams and Hadley, which had proved unsuitable for the rearing of fish beyond the fry stage, were sold under authorizations from the Legislature (chapter 5, Acts of 1920, and chapter 49, Resolves of 1912). One thousand two hundred dollars was received for the Adams and \$200 for the Hadley property.

#### *Pheasant Rearing versus Duck Rearing.*

A radical change was made in the bird work this year by the discontinuance of the breeding of mallard and black ducks in favor of pheasants. Black duck rearing appears to be unnecessary as they are multiplying rapidly under Federal protection. With reference to the mallard duck, the conclusion was reached that it is financially prohibitive to produce a mallard sufficiently wild to serve for stocking purposes.

Pursuant to the policy which has been adopted of submitting any large change of work to the parties in interest, a questionnaire was sent to all persons who had received mallard duck stock, including among the questions the following: —

Assuming our funds are very limited, would you advise continuing the breeding of mallard ducks, or would you expend the money on breeding increased numbers of pheasants?

The replies almost unanimously favored discontinuing the breeding of the mallard duck and devoting the funds to the further rearing of pheasants, with the result of increased production and the establishment of two additional brood stocks as hereinafter described.

#### *Planting of Eyed Fish Eggs.*

A method of distribution new in Massachusetts was adopted this year, — the planting of eyed eggs in wire baskets for hatching in streams which it is desired to stock.

The trout ridd, or artificial nest, has had its chief development in Europe, where for years it has been the means of stocking the inaccessible mountain streams. The method therefore has been thoroughly tested.

The first requisite for success is to make the plants under the proper conditions. A long stretch of stream is required, spring-fed to keep it free from ice and to give a suitable temperature. It should be shallow, with a fairly good current and numerous shallow eddies, but not many deep pools which would harbor large fish.

The eggs are placed in wire baskets or trays, containing about 2 square feet of surface, built of heavy mesh wire of such a size that the eggs will not fall through. The proper age at which the eggs should be planted is from one to two weeks before they are ready to hatch. They are spread evenly in the baskets, in numbers varying from 500 to 1,000 to the square foot. The tray is placed in the stream, set on small wooden uprights forced into the bottom of the stream and held about 2 inches above the bottom, so that the water entirely covers the container and its contents. The flow should be such as to give complete circulation in every part of the tray. After the basket is placed in position it is protected and concealed by covering it with brush, or evergreen boughs in the form of a lean-to over the stream.

As the eggs hatch the fry drop through the mesh of the basket into the silt, and lie quietly on the bottom until they begin to feed. When that time comes they rise and scatter far up and down the stream in search of suitable feeding grounds. This simulates closely the natural method of propagation.

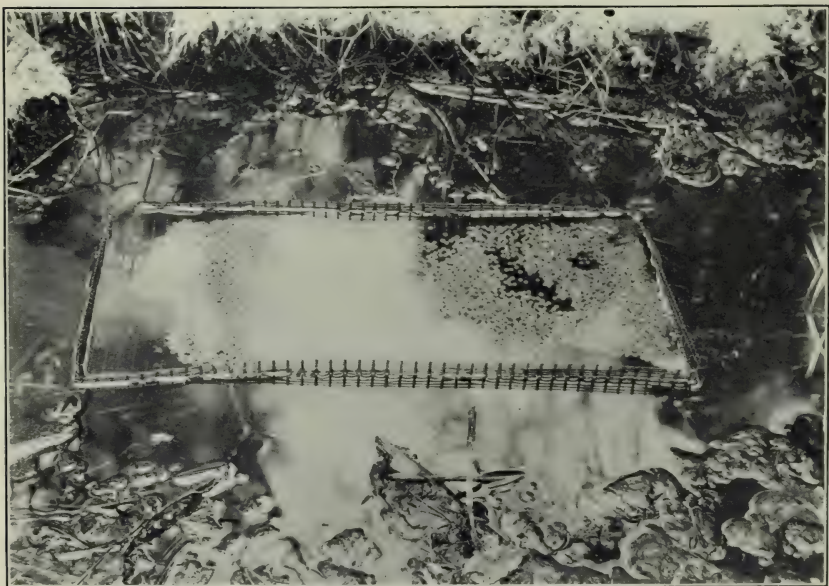
This method of planting was initiated at the suggestion of L. B. Handy, Esq., of Wareham, a well-known commercial fish culturist, who gave gratuitously a good deal of time in doing the work. He was assisted by various members of the force. The plants totaled 405,000 eggs. The trays were collected by the wardens after the lapse of sufficient time for the eggs to hatch, and the reports were uniformly that the percentage of hatch had been large. Owing to the rigorous winter it was difficult to check up results further until later







Planting eyed trout eggs in brook. Placing the tray in position.



Planting eyed trout eggs in brook. Close-up view of tray in position.



Planting eyed trout eggs in brook. Location of tray concealed by brush.





in the spring, but the men reported that in every locality where eggs had been planted unusually large numbers of fry were seen in the spring.

## FISH HATCHERIES AND GAME FARMS.

### *Palmer Fish Hatchery.*

The work at the Palmer fish hatchery proceeded on about the same lines as in former years, but with no expansion, owing to financial conditions. Much-needed improvements were made in the double tenement house, — new floors, stairway, installation of water supply, raising the floors which had settled, and putting in new sills and posts.

A pond was started for rearing shiners for bass food. At odd times brush was cut, and a dirt dam constructed. The old barn back of the double tenement house was torn down and the lumber sorted for future use; the bank near the superintendent's house was excavated preparatory to building a garage, and the dirt used in grading in rear of the superintendent's house; the construction of a garage suitable to accommodate three automobiles was about completed. The addition to the station's equipment of a 1-ton Stewart truck meant a considerable money saving and better distribution service.

*Small-mouth Black Bass.* — To the brood stock of small-mouth black bass brought over from last season were added a sufficient number of adult bass (seined from water supply ponds in Fall River through the courtesy of the Watuppa Water Board) to make up the necessary quota for the available breeding ponds. The ponds at the Palmer hatchery number nine, — three water supply ponds and six bass ponds. This year four of the latter were used in breeding bass, a total area of 117,530 square feet. One more breeding pond was partially built. The lateness of filling the ponds was unfavorable to the growing of insect life therein and there was not much food for the young bass fry to feed on. As a consequence not as many fingerlings were produced as would have been the case had the ponds been filled earlier in the season. There were 235 breeders placed in the ponds, from which

172,000 fry, 66,000 advanced fry and 27,650 fingerlings, were produced, all of which were distributed.

Towards the close of the year work was taken up on the construction of two more bass ponds, which will increase the output next year by one-half if they can be completed for use next spring.

*Large-mouth Black Bass.* — The limited number of large-mouth bass reared were grown to be a brood stock for next season, except for a shipment of 7,000 to Eastern Harbor, Provincetown.

*Chinook Salmon.* — There were 400,000 Chinook salmon eggs received from the California and the Washington commissions. The former came in good condition, but from the latter lot over 50,000 dead eggs were removed immediately after being placed on the hatching trays. The fry were weak and many died soon after hatching. Before the food sac was entirely absorbed the salmon were transferred from the hatching troughs to three dirt pools, about 65,000 in each, and the remainder to wooden pools. Even at the start the fish in the dirt pools fed more readily and grew about one-third faster, and the loss during the feeding period was at least 70 per cent less than in the wooden pools. This rapid growth and smaller mortality was due to the more natural conditions, — opportunity to spread out in deeper water, and more or less live food not available in the artificial pools. Trials in 1919 had given the same results. From the 400,000 eggs there were reared and distributed 251,300  $2\frac{1}{2}$  to 5 inch fingerlings, disposed of as follows: 34,400 to the Sandwich fish hatcheries for further rearing; 202,400 in the tributaries of the Merrimack River; 5,000 planted in Norwich Lake, Huntington, and 9,500 in Spectacle Pond, Lancaster.

*Silver Trout.* — The 250,000 silver trout eggs were received from the Washington Fish and Game Commission in fair condition, and resulted in 198,500 fry, which were planted in the following ponds: —

Norwich Lake, Huntington,	49,000
Onota Lake, Pittsfield, . . . . .	50,000
Big Alum Pond, Sturbridge, . . . . .	50,000
Lake Garfield, Monterey, . . . . .	49,500

*Brook Trout.* — Eggs were taken from wild stock in the brook, eyed, and sent (30,000 in number) to the Sandwich hatcheries.

*Salt-water Smelt.* — The 32,000,000 smelt eggs received from the field station at Weir River, Hingham, produced 24,750,000 fry. This was not the full number desired for hatching, but was all that could be secured, owing to a poor run of fish.

*Pike Perch.* — The supply of pike perch eggs collected in Vermont (18,150,000 eyed and green eggs) came in good condition, and 9,750,000 fry were hatched and planted.

*Yellow Perch.* — Hatching of yellow perch was discontinued this year. It was thought best to relieve the Palmer hatchery of as much battery work as possible, in order to devote more time to rearing bass. The 250 fingerlings left over in one of the ponds were planted in Forest Lake, Palmer.

*Horned Pout.* — The 5,000 horned pout fingerlings produced last year by the adults held in the pond were seined out and distributed. Through the courtesy of the Flagg Ice and Coal Company, Inc., 200 adult horned pout were seined from the company's pond in Brockton and shipped to Palmer for brood stock. They were placed in the supply pond near the hatchery, but close watch failed to reveal any beds of eggs or young fish. There were 200 more adult horned pout received from a pond on the estate of I. H. Wallace of Fitchburg, but came too late for breeding. The stock of 800 breeders in the supply pond failed to produce any young this season so far as could be ascertained.

#### *Sandwich Fish Hatcheries.*

Replacement and repair work and certain necessary construction was carried along with the production of fish. At East Sandwich four large rearing pools were built at the lower end of the hatching grounds to utilize the spring water coming from the banks and two more back of the meat house to utilize the surplus water there. Three large plank pools were rebuilt to replace the old ones that had rotted out; new raceways were rebuilt in all old wooden pools, and new screens made; shade boards were built for all new rearing pools, and covers for the supply tanks. Extensive grading was done



around new pools. The hatch house that was built last fall was completed, and sixty wells driven to supply hatch house and pools.

At the Sandwich station two new rearing pools were built at the upper end of the cement pools, and grounds graded around the same. A ditch was dug back of the meat house in order to carry off the surplus water from the creek coming from the swamp and protect the grounds from spring floods. The old ditch was filled and grounds graded. Wooden pools back of the meat house were reconstructed and wells driven to give them a fresher supply of water. The six lower cement pools had been supplied with water from the pools above. By the time the water reached the lower ones it had become stagnant and a fresher supply was needed. To remedy this condition the lower pools were partly filled with sand, a new head trough built, and wells driven to supply them.

*Brook Trout.* — The brook trout egg collections of the fall of 1919 approximated 5,000,000, — a portion of which were distributed as eyed eggs, — 1,860,000 being sent to the Sutton hatchery; 200,000 to the State of California in exchange for Chinook salmon eggs; 750,000 to the State of Washington in exchange for silver trout eggs; and 325,000 planted in brooks as an experiment in planting artificial trout egg nests, already described. The remaining eggs were retained for hatching, and resulted in strong, healthy fish. There were 90,000 planted as fry, and the remainder held for further rearing, and indications pointed to a very satisfactory output of fingerlings at the close of the season.

In May a severe epidemic attacked the trout at the East Sandwich hatchery, starting with the adults and yearlings kept in the brood stock pools. Immediately the biologist was detailed to study the situation, and, when measures to check the disease proved unavailing, the best talent of the country was consulted, — nearly all in person, — such authorities as the experts of the Bureau of Fisheries at Washington, D. C. (notably their fish pathologist, Dr. Franz Schraeder); Dr. E. E. Tyzzer of the department of comparative pathology, Harvard Medical School; Dr. Theobald Smith of the de-



partment of animal pathology of the Rockefeller Institute for Research and Dr. Peter J. Olitski of the Rockefeller Institution; Dr. F. P. Gorham of the department of bacteriology, Brown University, Providence, R. I.; Dr. Lester Round, Pathologist, Rhode Island Board of Health; Dr. Oscar Teague of Columbia University; Dr. Fred Weidmann, pathologist of the Philadelphia Zoölogical Gardens; Dr. H. B. Ward of the department of biology, University of Illinois; Dr. Jacob Reighard of the University of Michigan; Dr. C. B. Coulter, Long Island College Hospital, New York; Dr. Harold Babcock of the Museum of Natural History, Boston; the fish experts of the State fish commissions of New York, Pennsylvania, Minnesota, New Hampshire, New Jersey, Wisconsin and Michigan.

A rigid quarantine was at once placed on the hatchery, and no further distributions made. The disease baffled the efforts of all fish culturists. From the brood stock it spread in June to the fingerlings, then nearly ready for distribution, and in two months' time it had destroyed 20,000 brood fish and approximately 250,000 fingerlings, practically wiping out the brood stock. It eventually became necessary to adopt the radical expedient of killing all the surviving fish and sterilizing the whole station, to ensure the eradication of the plague. Before this was done, however, there was an opportunity for the study of the conditions influencing the spread of the disease, and of the application of remedial measures. The biologist devoted his entire time to the East Sandwich hatchery until well into the fall. The results of his study, embodied in his report, will prove an important contribution to our knowledge of fish diseases.

*Etiology.* — The causative organism, readily isolated at the commencement of the epidemic, is a pleomorphic bacillus, similar in many respects to the bacillus of fowl cholera. It produces a septicæmia, or blood poisoning, in the fish, 60 per cent of which show no local lesions discernible to the naked eye. Forty per cent show external ulcerated lesions of muscle, over various parts of the body. In all cases the bacterium may be obtained in large numbers from the heart blood. As far as can be learned, this organism is pathogenic only for fish. It is absolutely harmless for man, as it will not live at the temperature of the human body.

*Name.* — The disease is not new, having been first described in 1894, in Germany, and since then in England, Ireland and in the United States. The name "Furunculosis" (usually applied to the development of boils) was erroneously given it by the first investigators. As applied to this affection as a whole, it is a misnomer, since it describes only one limited phase of its protean character, and does not take into consideration the important septicæmic condition which causes the death of the fish.

*Distribution.* — Originally believed to be confined to artificially reared fish, it is now considered to exist among wild fish. It is not merely confined to the *salmonidæ*, but attacks all species of fresh and salt water fish indiscriminately. Thirty species of salt-water fish experimentally inoculated with virus of the disease rapidly perished. It is present in continental Europe, Great Britain and the United States, having been reported to exist in New York, New Jersey and Michigan. This instance is the first occasion of its being recognized in Massachusetts. Undoubtedly it has a much wider range both in fresh and salt water than is ordinarily supposed.

*Epidemics.* — Epidemics among fish are by no means uncommon, especially if artificial food and lack of exercise render the fish much more susceptible than ordinarily would be the case. This epidemic is perhaps the most virulent on record in the case of this particular disease, and for that reason proved of especial value for study.

*Investigation.* — A study of the conditions influencing this disease was made during the past summer. The results thereof, in many ways disappointing, are nevertheless of great practical value to this Division, in so far as its future work is concerned, as they indicate methods for preventing repetition of such a condition. Among the observations recorded are —

(1) Effectiveness of quarantine measures. By a rigid isolation of the East Sandwich hatchery the disease was kept from the Sandwich hatchery, under the same management, 3 miles distant.

(2) Necessity of sterilizing or cooking fish utilized as food at the hatcheries, in order to prevent the transmission of bacterial or parasitic diseases which might be present and not in evidence.

(3) Epidemics may be controlled by keeping water temperature below 55 degrees Fahrenheit, but the disease cannot thus be eliminated.

(4) Chemical sterilization of the water proves effective in reduction of mortality or power of transmission.

(5) Chemical baths, the usual alternative resorted to by fish culturists, proved ineffective, and even harmful.

(6) Radical extermination, or complete isolation, of all infected stock, as soon as disease is recognized, followed by thorough sterilization of premises, should be effected.

(7) A ban should be placed upon all distribution of fish from an infected hatchery.

(8) This disease is harmless to warm-blooded animals and man.

The distribution of fingerling fish made from the Sandwich station, to which the epidemic did not spread, was as follows: —

Amherst rearing station for further rearing, . . . . .	100,000
Montague rearing station for further rearing, . . . . .	450,000
Canton Fish and Game Association for rearing, . . . . .	8,000
Southeastern Fish and Game Association of Brockton for rearing, . . . . .	50,000
Public waters, . . . . .	215,000
Retained as additions to brood stock, . . . . .	35,000

This last 35,000 included from 15,000 to 20,000 fine fingerlings reared from 30,000 eggs from wild stock at the Palmer hatchery. In the early winter, after the taking of eggs, 7,577 adults were shipped from the two branches of the hatchery. The greater part was from the East Sandwich hatchery before the disease broke out.

*Chinook Salmon.* — From the Palmer hatchery 34,400 Chinook salmon were received for rearing, of which 2,800 were dead on arrival. The remainder were held for some months and later in the year were planted in the following ponds as large-sized fingerlings: —

Peters Pond, Sandwich, . . . . .	10,534
Long Pond, Plymouth, . . . . .	10,376
Cliff Pond, Brewster, . . . . .	10,495

The young Chinook salmon hatched from eggs spawned in fresh water by mature salmon at the Sandwich hatchery were liberated in April in Peters Pond, Sandwich, as the pond they occupied was required for other purposes. They numbered 1,000 and averaged in size 2 inches and over.

*Silver Trout.* — On January 9, 250,000 silver trout eggs were received from Seattle, Wash., in good condition, with a loss of only 2,500. These were in exchange for brook trout eggs. During hatching, however, large losses were experienced. The fish resulting from this lot of eggs were planted as advanced fry, as follows: —

Peters Pond, Sandwich, . . . . .	30,000
Cliff Pond, Brewster, . . . . .	30,000
Lake Attitash, Amesbury, . . . . .	40,000
Boylston Street Reservoir, Brookline, . . . . .	10,000



The silver trout is in reality a landlocked black or sockeyed salmon.

*Alewives.* — Further experiments in hatching alewife eggs were carried on, which are discussed under the topic "Alewives."

#### *Sutton Hatchery.*

The Sutton hatchery was operated on the plan of the previous year as a hatching and rearing station, and was stripped of all stock at the close of 1919, until the eggs from the hatch of 1920 were received.

The work was conducted on about the same scope, with the exception that the fingerling output was largely increased, and other details were modified by the arrangement that united with the conduct of the hatchery the supervision of two rearing stations and various special enterprises in the way of field work. These duties took more than one hundred and fifteen days, or one-third of the year, from the working time at the hatchery. It did not in any way affect the output, but curtailed general care and upkeep, and deferred the construction program. Sheathing and painting of the interior of the meat house and cook room was finished. The upper hatchery was sheathed, and the inside painted and fitted with double windows, removable from the inside, to fit it for winter use.

After the rush of spring work the program of new construction was started. The work was done on units that could be developed temporarily to carry fish for the season, the permanent work to be put in afterwards. In carrying out this work a pool was dug out on the spring supplying the old plank pens built in 1897, and this water was used without detriment to the ponds below. On the east side, where the outside rearing troughs were removed two years ago, the water used to feed them was made to supply two ponds dug out nearer to the spring, so after this use it could flow into the concrete pond that it formerly supplied. On the upper part of the brook, above the dam that raised the water to supply the upper hatchery and the nursery pools, the brook channel was made into a series of rearing pools extending to the boundary line of the hatchery grounds. This was done with

temporary dams, to be made permanent later, if it proved that this development did not interfere with the proper use of the water below.

The springs in the adjoining valley one-half mile to the south were again used when it was found that the new work would not take care of the excess fry, and the pools that had lain idle for two years were utilized with only a slight cleaning. These pools carried their stock through without loss or mishap, although distant from any possible supervision or regular attention.

The chief improvement program for the year was undertaken in the fall in making more permanent some of the earlier construction, and in replacing with permanent concrete work the plank pens built in 1897. In place of one pond having a capacity of 10,000 fingerlings, and one having 5,000 capacity, four ponds were built each with 8,000 to 10,000 capacity. Concrete was chosen because the lower end of the location had been filled with soft silt, and the upper part had beds of quicksand, and neither part would maintain a bank suitable for an excavated pond.

*Brook Trout.* — There were received from the Sandwich station 1,860,000 brook trout eggs, of which 80,000 were re-shipped for experimental planting. The quality of the eggs, all of which were eyed, averaged fair. The eggs showed a loss of 315,000 up to the completion of hatching, and the fry a loss of 265,000 up to the time when all were feeding in ponds. At that time, early in June, the number was estimated at 450,000, and these fry yielded in the distribution that lasted from the middle of August to the middle of October 254,825 fingerlings.

The spring distribution of fry totaled 700,000, — 320,000 to Montague and 380,000 to Amherst. The final shipment to each station was from the last hatched yearling fry produced from the eggs that in hatching had suffered the heaviest losses and gave the most unpromising fry. These lots were shipped to test this quality of fry for rearing; and while the percentage reared was much lower than with the fry from adult eggs, the quality of fingerlings produced was quite as satisfactory. The production of yearling eggs is necessary if the stock is kept

to spawn as two or three year olds, and if this stock can be kept in such numbers that the earliest to mature can be discarded, the quality of eggs secured then will justify their production in large numbers. The unspawned yearlings if planted out immediately in streams supplied with spring-fed nursery brooks, where they can spawn naturally, will make a valuable addition to the output.

Distribution of fingerlings began in August. The distribution was made to an increasing extent by truck, and with increasing efficiency, as no losses resulted, and the numbers handled were substantially increased by carrying heavier loaded cans than would be practical by rail. In an ordinary trip by truck oftentimes promising brooks are passed and are unimproved because of lack of local initiative in filing applications. By understandings with the local distribution organization such brooks were stocked as the truck passed through en route for other districts, and the additional fish credited to the local organization. This made a wider distribution at less expense for these associations, and avoided the common error of getting a congestion of fish into near-by brooks.

*Brown Trout.* — As set forth elsewhere, brown trout rearing was resumed at the Sutton hatchery. A small stock liberated in the stream in previous years was recaptured and 30,000 eggs were purchased from a dealer in New York. They hatched well, but were very late, giving the fingerlings only a short season for growth. The entire stock was carried over until next year, part destined for brood stock and part for distribution.

The development of the brown trout to an extent commensurate with its importance does not require a separate plant, as its culture can be combined to great advantage with the brook trout.

The construction of a new hatching house is regarded as the greatest need for the next year. The old hatching house is not far from collapse; the heating plant is of slight use, and has to be supplemented by oil stoves; the troughs are in the last stages of decay and are kept in use only by replacing the wood by concrete as it decays; the supply pipe, corroded to a thin punctured shell, is kept in use only by wrapping.



*Rearing Stations.*

As a two-year trial had demonstrated the suitability of the Montague and Amherst sites for the rearing of fish, early in 1920 the superintendent of the Sutton hatchery was detailed to study the lay-outs and formulate a plan of systematic development.

In the absence of means for permanent construction, the use of pools, formed by dividing the brook channel into sections by means of small temporary dams, was decided upon as affording sufficient capacity for the increase desired in one year's work, and not interfering with any permanent construction. All existing equipment was used, and the ponds which supply the rearing pools were fitted for fry ponds, although kept in their former use also.

At the rearing stations (where one of the objects is to have the fish raised to age of distribution in the locality where they are to be planted) many fingerlings can be raised to the yearling size. In moderate numbers they would subsist on the waste from feeding fingerlings and larger numbers could be fed on a cheaper grade of meat. They can be kept and will make their best growth in water that is substantially beyond the use of fry, and, if distributed in numbers with reference to the spawning facilities where they are put, they will give, in effect, a double stocking, as besides the stock of well-grown fish for the greater stream they will, by ascending the nursery streams and spawning there, stock these streams with fry the next season, and to a large extent this stocking will be in the inaccessible places not reached in ordinary distribution. Stocking with yearlings has a special value to a stream that by reason of unfavorable conditions, or over-fishing, has been depleted of its brood stock.

*Montague Rearing Station.* — Operations were begun at Montague in February while the snow lay deep, and were pushed through the later period of the unusual winter conditions, so that a considerable part of the work was done and the ponds stocked before the end of March. Work during this period was largely in making additional channels for the brook, as the flow was too great for one. These channels were

made by loosening the soil and allowing the silt to be carried down stream, where it was used in making a dyke to form a diversion channel to carry silt and flood water around the pond, and, whenever required in winter, to divert the excess spring water so that the ice would form on the pond for cutting. This work promises an effective control of the water to be supplied below for hatching, and, when necessary, it can be used at temperatures varying from 35 to 50 degrees. As the season advanced and conditions permitted, the work was extended to the east branch, and pools were constructed toward both sources as far as was justified by the flow of water. On account of lack of suitable material for making the type of dam used on the other brook, which, although temporary, will serve for several years, dams were made of sand bags, and will require replacement before another season.

A pool was constructed below the large dam, to hold an assortment of exhibition fish. Below the junction of the two brooks a screen of large capacity was built to guard against loss of fry in an overflow.

The part of the land purchased last year from the Fournier farm was fenced with a woven wire fence, and a new road from the highway was opened wholly on the station land. A small planting of pines was made at the most exposed point where drifting snow would make a windbreak necessary. The shelter house formerly used at the Pittsfield station was erected near the brook below the rearing pools on a concrete foundation and fitted for a meat house.

Cutting brush and cleaning to open the ground in advance of work continued through the season. Excavation for yearling pools was begun below the lower screen. A channel was cut to take the winter flood water from the east branch and carry it to a point below the yearling pools. This channel is not subject to flood during the summer, and will be used for fingerling work. The embankment made in carrying the overflow channel down the valley cuts this section off, and it has been laid out as a rearing pond where the line of pools down this branch will terminate. At the upper end of this branch, at a point where a road can be laid out to the ice house over level ground, a section of the valley has been

cleared for an ice pond, and a road leading to it cut through the brush.

Shipments of fingerlings for rearing, numbering 450,000, were received at the Montague station from Sandwich, and, deducting losses in transportation, 309,000 remained for rearing. Losses were heavy on account of transportation in cans which experience proved to be unsuitable, that is, 20-gallon cans used by reason of shortage of the 10-gallon ones in ordinary use. Receipts from Sutton numbered 320,000 fry, which losses in shipment brought down to 317,000, making the total to be reared 626,000. They made good growth during the summer, and those in the water supply pond grew particularly fast, some being 6 inches long in September. These latter, numbering approximately 20,000, were reserved for rearing to fingerlings. Distribution, which began July 7, was made entirely by truck. Total plant, 183,000.

*Amherst Rearing Station.* — The Amherst station was opened on March 18 when the pools were buried under snow, the ground deeply covered, and only the larger watercourses open. The snow was disposed of, the pools dried and painted, the natural pools excavated and finished for use in the open channels from the upper springs, and on March 25, a week from the opening, the first fry were shipped in. The work of building the natural pools was pushed rapidly, and all were substantially ready by the middle of April, the last shipment of fry going in on the 17th.

The reservoir was cleared out and screened for holding fry, although still kept in use for feeding the nursery pools. The waste ditch from this pond and from the nursery pools was utilized for a line of pools extending from the dam to the west side of the lot, but the flow of water was too great in the lower part for practical use, and in the upper part it was necessary to build a penstock from the pond to the unused stream in the center to divert a part of it.

North of this stream the smaller stream used to feed the wooden pools sunk in the ground was increased in volume by diverting several springs, some that flowed into the pond and some that flowed to the north branch. The water from these springs was brought in through small pools, and on the whole



length of the stream to its junction with the main stream natural pools were built. The wooden pools were removed and the material in them built into the new meat house.

The north branch rising near the main spring center, but flowing diagonally across the valley to the north side, and receiving there many tributary springs, was cleaned out and pools built with no appreciable amount of excavation, as the stream flowed in a depression well suited to the type of pools used. This stream was almost completely shaded by natural growth, and made a most valuable line of pools. Other pools were built on small tributary springs to test their capacity. The material to dam the stream at proper distances to form these pools was found in abundance on the ground. Tough sods were laid in layers over a 24-inch section of tile to drain the pool when necessary to catch the fingerlings, gravel was tamped in between the layers of sods, and the whole topped with a layer of cobbles bedded into the sods. This work gave very satisfactory service, and promised several years of usefulness.

A meat house was built on the high bank below the driveway to the rearing pools, so as to permit the construction of a concrete basement under it in the near future for a meat room, the upper part then to serve for a workshop and can storage.

At the end of the rearing season extensive cleaning on the grounds was done, and openings were cut through the thick brush to facilitate surveying and locating future construction.

The camp was moved to a new location where it could be in partial shade, set on a concrete foundation, and the foundation for a veranda was put in, to be completed later.

The stock was made up almost wholly of late fry, but its growth exceeded the expectation for early fry and showed a hardiness and vigor that could not be excelled. The station and the stock was subjected to a very severe test in July by a local cloud-burst. The flood of water overflowed the banks of the water courses, and all pools were deeply submerged, some being completely filled with gravel, and in others the dams washed out. From these pools the fish were forced out to the pools below, but in all the others there was only a moderate drift down stream. This confirmed previous experience as to the tenacity with which the fish will cling to

their home pools. In a case like this they sink and lie close to the bottom, but it shows the importance of guarding against the unexpected by having a large emergency screen and pool at the lower end.

Of the 480,000 fry received at Amherst, over 100,000 were lost in transit. The loss in rearing was moderate at all periods, and from about 360,000 placed in the ponds 152,400 fingerlings were distributed. But for the summer flood this would have been almost 170,000.

During the year the 6 acres of land held under lease at the Amherst rearing station, having proved suitable in every way for the requirement of the station, were purchased from Lillian B. Graves for \$447.75.

*Pittsfield Rearing Station.* — This site was definitely abandoned, having proved entirely unsuitable for fish culture. The lease was permitted to lapse, and materials belonging to the Division removed.

#### *Sandwich Bird Farm.*

The heavy snow of the winter of 1919-20 made the task of caring for the stock a laborious one. Storm after storm made it a continuous struggle to keep the paths open so that the stock could be cared for, and to keep the wire tops of the covered pens clear. Very little construction work was done, except that the work shop was completed by addition of a cement floor, making an excellent room for the incubator. Some trimming of brush was done and the gravel walk was improved upon in duck yard No. 2. With the arrival of spring the regular routine of the breeding and planting season was followed, but as it was practically impossible to hire help in plowing and harrowing, the desired amount of farming could not be done.

*Ducks.* — About the first of April, pursuant to the decision to discontinue the rearing of certain ducks, the brood stock of mallards (17) and black ducks (56) were distributed. This sudden change in plans caused an extra amount of work as the ducks had already been placed in their breeding yards and were difficult to recapture.

*Wood Ducks.* — The wood ducks alone of the ducks were retained, and breeding will be continued in accordance with

the expressed wish of various persons interested in them. Starting with a brood stock of 101 adults on December 1 the shipment of 7 and the loss by death of 19 reduced the number placed in the breeding pens to 75. This season was less successful than last. Though the weather conditions were almost perfect, additional work in changing over the equipment left less time for the care of the young stock, and this was reflected in the output. There were 483 eggs collected, of which 26 were distributed, 18 broken, and 439 set under bantams, hatching 299; 208 were lost from all causes; 91 were raised, of which 56 were distributed, 14 kept for brood stock, and 21 disappeared after attaining full growth. Among the brood stock there have died and disappeared since spring 16 birds, leaving 59 adults, which, added to the 14 young retained for breeders, makes 73 ducks to carry through the winter.

*Pheasants.* — With the duck work discontinued all efforts over and above the work on quail were directed to the rearing of pheasants, pursuant to the year's plan. Pheasant rearing is new work at this station. The late date at which the change was made did not permit extensive preparations, and the only equipment was the station's one small incubator and the flock of bantams, together with three incubators and four brooders which were borrowed. After considerable delay 3,044 eggs were secured (1,420 from the Wilbraham Game Farm and 1,624 from commercial dealers). The fertility of the eggs varied greatly. On the whole, and taking into account the unpreparedness for the undertaking, and the inevitable weakening of the germs through transportation, the results were fairly satisfactory. The hatch of young pheasants was 1,389, and 514 were raised to maturity. Of these, 310 were distributed, and 204 held for the following year's brood stock. Before the close of the fiscal year this number was reduced, through losses and escapes, to 172 to carry through the winter. Construction of a large covered yard for winter quarters was started about November 1, and by the close of the year a portion had been completed and the brood stock safely housed.

*Quail.* — At the opening of the year 121 breeders were on hand, to which a new stock of 31 birds was added. In February 9 were buried under the drifting snow during a very severe



storm and later were found dead in roosting formation. Further losses of 10 and the shipment of 15 excess cocks to the Franklin Park Zoo and to Brockton for breeding purposes left 58 pairs placed in breeding quarters. The season, as far as vegetation was concerned, was three weeks behind time, and the quail laid late in consequence. In spite of the severity of the weather the stock came through the winter in first-class condition and good results were anticipated. Results in rearing the young were rather poor, however, though the weather conditions were almost perfect. This can only be accounted for by the reduced amount of attention they received, because of overwork in other branches. There were 1,105 eggs collected, 12 of which were distributed, 56 broken, and 1,037 set under bantams. From these, 664 were hatched and 176 raised. After distributing 64 of these birds the balance of 112 were added to the brood stock for next year, making a total of 178.

*Vermin.* — While always present on a game farm, vermin have their seasons of abundance and scarcity. The rat, for instance, is always to be contended with, although this season they have been better under control here than ever before. On the other hand, the weasel shows up only at certain seasons. A very few are caught in the late fall and winter, and then no more are seen until June or even July, when a whole family will show up at once, and remain until the last one is caught. Apparently the family has been raised some distance away, and their roving disposition carries them to fields anew. This season the station was visited by 5, all of which were caught in two days before any injury had been done to the stock. The first of August a party of 4 appeared, which it took a week to capture. Meantime 15 young pheasants, 4 wood ducks, a bantam and a rooster became their victims. The last visitation came about September 20, and the animals being older, spread over more territory. Their toll was a bantam mother with 10 young quails, 6 adult quail in one row of breeding coops and 21 in another row, and it took ten days to catch them.

The hawks are usually scattering birds or pairs during the winter and spring months, and can usually be controlled. The greatest trouble is experienced during the fall migration.

They do not appear in flocks, but one, two or three every day. This lasts several weeks and they are very annoying and destructive to the young and oftentimes to the bantam mother. During September the station employees captured on an average nearly a hawk a day, mostly Coopers, a few sharp-shinned, and one sparrow hawk. The marsh hawks, though present all summer and fall, did less damage than common. Though it is difficult to estimate the amount of damage done by hawks at this time of year, probably 10 per cent during September is a fair estimate.

The great horned owl is a regular visitor between September 15 and March 15, attracted by the ducks. Skunks are scarce and do practically no damage. There are occasional visits from coons. Foxes do occasional damage, but their numbers have been greatly reduced the past few years.

List of vermin killed during the season of 1920:—

Great horned owls, . . . . .	7	Coon, . . . . .	1
Red-shouldered hawks, . . . . .	2	Skunks, . . . . .	2
Cooper hawks, . . . . .	41	Snapping turtles, . . . . .	12
Pigeon hawk, . . . . .	1	Black snakes, . . . . .	4
Sparrow hawks, . . . . .	5	Rats, too numerous to mention.	
Weasels, . . . . .	18		

### *Marshfield Bird Farm.*

When the fiscal year opened there was on hand a selected brood stock of 506 mallard ducks. As previously stated it was determined to discontinue breeding these birds. In March this stock was disposed of by sale or distribution in the covers, and with very little notice of the proposed change Superintendent Sherman was asked to put his plant into condition to carry out the experiment of raising pheasants by the use of incubators and brooders on a large scale. For some time we have had the growing conviction that some method must be devised to produce more pheasants and at a less cost than has been accomplished at our stations in the past few years. While some improvement seems possible in the old method of hatching and rearing by bantams, it seemed that still greater results must be achieved, and the experiment with the incubators and brooders was undertaken. Marshfield was selected for this

purpose for the reason that this station was already equipped with incubator house and incubators, and two brooder houses, one 100 feet and the other 200 feet in length, both artificially heated. No other station is so equipped. The plant had to be remodeled to the extent of filling in some of the runs adjoining the brood houses so that they would be less moist than was necessary for the ducks, and much of the wire netting had to be changed to a smaller mesh, though all of the wire at the station was used in remodeling. Carpenters being unprocurable, five wardens did the work. Before construction work could be completed the breeding season arrived, bringing its own work, and the building of yards was interrupted to be resumed of necessity when the birds reached the stage where they required new quarters. For lack of wire the yards in front of the house were not completed until the first of November. For the accommodation of the breeding birds 15 pens were built in the orchard, where the birds would be undisturbed by visitors. Five portable brood houses were constructed by the superintendent during the spring months for additional rearing quarters for young stock. A portion of the green food needed for feeding was raised on the farm, — clover, mangle beets, lettuce, cucumbers, melons and cabbages.

The pheasant stock brought over from the previous year consisted of 65 of the incubator-hatched, brooder-reared birds raised experimentally in 1919 and 20 purchased from outside sources. Twenty excess cocks were liberated, leaving 65 birds as the egg-producing stock for the season's work. There were 2,295 eggs secured from the station's brood stock and 5,212 from other sources, 3,000 from the Wilbraham game farm and 2,212 from private dealers. After elimination of broken and unsuitable eggs, 7,378 were set in incubators; 3,889 chicks were hatched (the balance of the eggs set were accounted for by dead germs and infertile eggs).

Hatching was done entirely in incubators and rearing in brooders. During the process of incubation it was the practice to make two tests, and all infertile eggs were eliminated. As each setting hatched out, the young birds were allowed to remain in the machine for a time until dried off, then transferred to the small brooder house and each lot kept separate



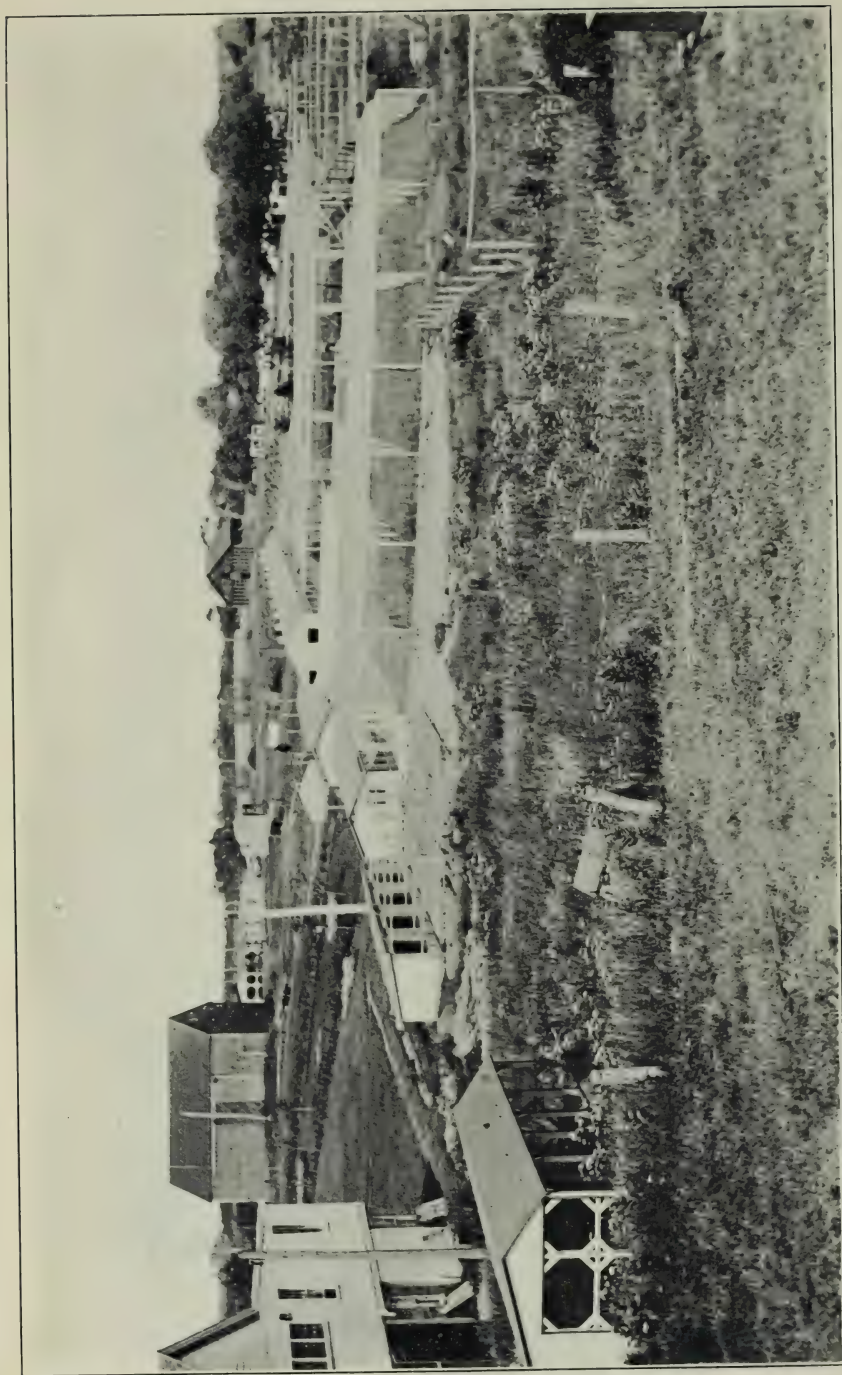
from lots previously hatched. A rate of temperature was maintained that would ensure against chilling until such time as the chicks were strong enough to be moved to the large brooder house. In this latter house they were moved from section to section through gradually lower temperatures, until finally they were entirely without artificial heat.

When the young birds reached the heatless section of the brooder house they were provided with outside runways, to which they had access in pleasant weather. In unfavorable weather the doors were closed and the birds confined to the house. On reaching the large brooder house, generally at the age of from ten days to two weeks, the birds were turned into pens trimmed thickly with small trees and heaps of boughs so arranged as to furnish hiding places, — this with the idea of letting the birds acquire the habit of concealment before they should be turned out to shift for themselves. Events proved this to be a very necessary feature of their bringing up, for on being first introduced into the dressed pens, the chicks showed no inclination whatever to take to the underbrush, but kept about in the open. After a few days, however, they learned to work their way into the brush, to take to cover when startled, and to roost or to conceal themselves in it at night. As the birds became larger they were held in runways of larger size until liberated.

The birds developed plumage rapidly, — feeding being regulated to that end, — and at the age of five weeks were properly feathered so that they might have been turned into the covers with entire safety. But the stock was held at the station until still further developed in order that the finest specimens might be selected for brood stock.

There were no losses from disease, though there was some mortality from overcrowded pens and lack of vitality in the young from the weaker eggs. Losses came mostly at night, for in the absence of a mother hen, the chicks become frightened easily and having no natural refuge huddle into corners, resulting in deaths by crushing. This was overcome by encircling the chicks at closing-up time with netting, forming a temporary fence of circular shape, thus depriving the birds of access to the dangerous corners. It was noticed





Marshfield Bird Farm, general view, showing equipment for pleasant rearing. Reproduced through the courtesy of the "Boston Globe," A. L. Belcher, photographer.

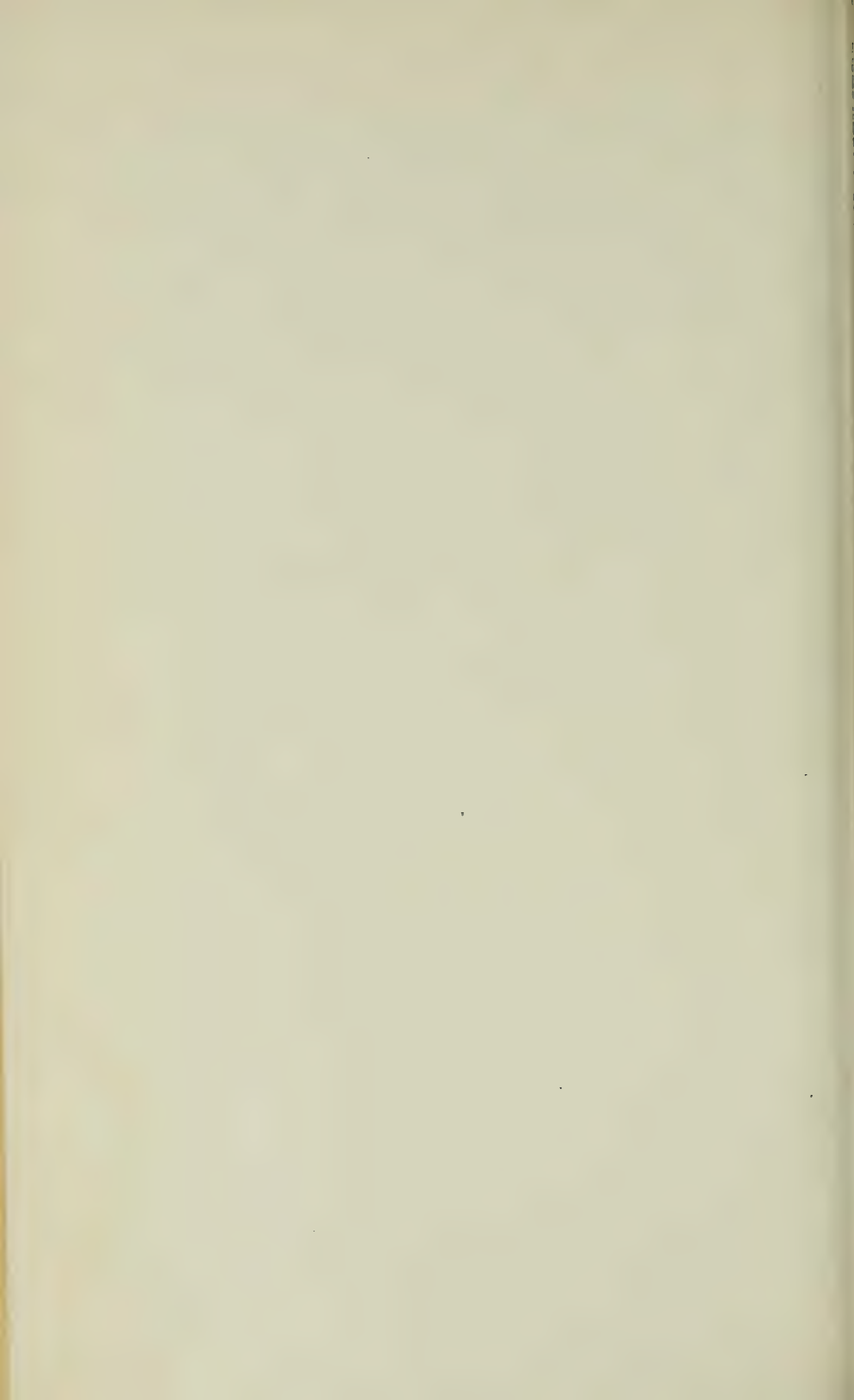




Removing a tray of pheasant chicks, just hatched, from the incubator, Marshfield Bird Farm.  
 Reproduced through the courtesy of the "Boston Globe," A. L. Belcher, photographer.  
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Pheasant chicks in brooder house, Marshfield Bird Farm. Reproduced through the courtesy  
 of the "Boston Globe," A. L. Belcher, photographer.



from time to time that a bird or two was missing from the pens, but the reason could not be discovered. One day, however, 174 birds disappeared within a couple of hours, and it was found that rats from a recently closed grain mill had secured access under the board approach to the house. Their extermination was promptly accomplished.

With the pheasants, as with the ducks, the most rigid cleanliness was observed in the yards, houses and utensils, no spoiled food was allowed to stand before them, and a supply of clean drinking water was available at all times.

There were reared 1,983 pheasants; 1,333 of which were distributed to applicants; 650 were retained for next year's brood stock, which will be sufficient to produce all eggs needed for the farm.

The hatching and rearing of pheasants on a large scale entirely without hens being a new departure, hitherto pronounced by game-bird breeders to be impossible, considerable interest was shown in the progress of the work. Many hundreds of visitors came to the farm, and some from distant States. Reels of motion pictures were taken by the Pathé Company, the Educational Films, Inc. (kineographs), and for the publicity work of the Fish and Game Division.

#### *Wilbraham Game Farm.*

At the beginning of the fiscal year, Dec. 1, 1919, account of stock was taken, large pens moved to new ground and so arranged as to protect the birds from the northerly winds and storms, and the brood stock placed in winter quarters. To the 530 pheasants on hand 50 were added by purchase, making the total to carry through the winter 580. Rearing coops were cleaned, repaired and packed away, and fuel gathered, and after the first heavy storm (about the middle of January) whatever time remained after disposing of the routine work was used in clearing the pens and buildings of snow. Very few changes were made in construction or improvements at the farm.

From the brood stock in winter quarters 2 birds were liberated and 7 died, leaving 571 breeders at the beginning of the laying season. That wheat is the backbone not only of human diet, but that of nearly all species of birds, was proved



this spring by the condition of the brood stock at the beginning of the laying season. Although the winter of 1919-20 was one of the most severe in point of cold, snow and water that has been experienced in the history of the station, the birds came through in the best possible condition. The winter loss was 7 birds from a stock of 580 (1.2 per cent) against a loss of 47 out of 591 (or 7.8 per cent) the previous winter, making the loss during 1919-20 6.6 per cent lower in the face of the unusually severe winter conditions. In explanation of this it is to be noted that wheat was practically unobtainable during the winter of 1918-19, so to forestall another shortage 50 bushels were produced on the game farm in 1919. This was used in feeding the brood stock through the winter of 1919-20. The actual results noted from the addition of this home-grown wheat to the regular winter feeding formulas were healthier and more active birds; smaller percentage of loss during the winter; higher fertility in the eggs; lower death rate in the shell, indicating stronger germination, and higher vitality in the young birds.

Although the winter brought a great quantity of snow and lasted late, yet when it actually gave way to better weather it did so rapidly, and the first setting of eggs laid came a few days earlier (and was larger) than in the preceding year. The first eggs laid were chilled by a severe storm of hail which covered the ground for twenty-four hours. The number of soft-shelled eggs was large because shells to feed the laying birds were unobtainable. This made a higher percentage than usual of eggs broken by setting hens.

The egg production of the game farm was 16,855, to which were added 400 purchased, making the total to be handled 17,255. These were disposed of as follows: 8,413 set under hens; 3,452 distributed to applicants; 1,420 shipped to the East Sandwich bird farm, 3,000 to the Marshfield bird farm and 800 to the Myles Standish State Forest for hatching; 170 lost.

The eggs set hatched 4,724 chicks, of which 1,041 were reared. Of these, 964 were distributed and 77 retained for brood stock.

At the opening of the hatching season, when more help was required to care for the setting hens, brood stock and young birds in the rearing field, it was practically impossible to

obtain men. Two new men employed late in the season proved incapable and were released. During the time they were on the force the percentage of hatch dropped noticeably.

Some of the first hatches were almost entirely lost through a sickness caused by the damp weather. The first symptoms are similar to a disease known as aspergillosis, or mold in the throat. It caused the birds to sneeze, choke and breathe with difficulty; in the more advanced stages the birds refused to eat, and grew gradually weaker until death ensued. In combating the disease rearing conditions were made as sanitary as possible and after considerable experimentation a fairly successful remedy was found. Treatment required much time (as the remedy had to be applied with a feather to the affected parts) and many died before they could receive attention. With the exception of this one sickness there was very small loss from disease.

When the birds are first put in pens, range conditions are duplicated as nearly as possible and they are fed plenty of green food, shells, grit and charcoal.

During the season 82 adult pheasants were liberated, — mostly egg-eating birds, those that began laying late in the season, and others undesirable for brood stock.

Very little farming was done compared with other years. Green food and winter vegetables were raised for the birds, and 2½ acres of corn and 12 acres of grass. Buckwheat was sown where coops stood during the winter.

The usual fight was made against petty nocturnal marauders. Especially during the summer months when the young birds are in the rearing field do the skunks, rats, crows and hawks exact their toll. With the help of a spirited dog, traps and the usual precautions, rats have been kept pretty well under control. Among the vermin killed during the year have been —

Skunks, . . . . .	31	Crows, . . . . .	14
Weasels, . . . . .	4	Marsh hawks, . . . . .	3
Cats, . . . . .	4	Red-shouldered hawks, . . . . .	3
Gray fox, . . . . .	1	Rats, . . . . .	32
Long-eared owl, . . . . .	1		

### FISH AND GAME DISTRIBUTION.

The work of distributing the stock of fish and game varied but little from that of the preceding years, though a few points are worthy of mention as having brought about better results. Mention has been frequently made of the desirability of distributing through the medium of auto trucks direct from the stations. This method was used more extensively in 1920 than in any previous year, and the results entirely justify the expense incurred. In fact, the expense which, at first glance, may appear to be of large proportions is no greater than the expense incurred in railroad trips where incidental expenses are to be met. The principal advantages gained from using trucks are that it is possible to meet consignees much nearer to the places of actual distribution; the receivers then have to drive but a short distance to the waters, and can return the cans immediately to a convenient point where they can be picked up by the truck returning to the hatchery.

Additional to the direct distribution by trucks many people have expressed a willingness to call at the hatcheries for their fish. This saves the State expense in transportation, and offers an opportunity to instruct the consignees personally as to the best way of handling the stock.

The lack of training on the part of the receivers in proper methods of liberating stock is another difficulty. Organizations throughout the State have regularly appointed committees to handle the fish or birds consigned to the organization. This is very desirable and there is no wish to bring any discredit on these persons who give so freely of their time and means in the furtherance of this work, but it is suggested, for the sake of efficiency, that care be used in selecting committees who are familiar with the work.

The can situation in 1920 was the same as in the past few years, — a poor market, and, where anything at all was obtainable, prohibitive prices. Efforts to place orders in February found the market sold to October 1, compelling once more loaning cans from hatchery to hatchery. This



somewhat delayed the completion of the work beyond the time set.

The increased facilities at Montague and Amherst, with a correspondingly increased output, eliminated the necessity of shipping fish from the eastern section of the State into the far western sections, with a consequent saving in expense. The wardens assigned as fish distributing messengers are annually showing increased efficiency and a splendid spirit of co-operation.

Salvage operations were concerned principally with the white perch at Marthas Vineyard and black bass fry at Fall River. The latter, conducted through the courtesy of the Watuppa Water Board, was largely of an experimental nature and entirely successful. With many ponds now barred to general fishing on account of being set aside as water supplies. If the Division can secure permission to transfer the surplus fish to open waters, the general public may have the benefit of these fish, which otherwise are serving no useful purpose, and more extensive stocking can be done than would be possible with only the product of the hatcheries.

The white perch distribution was, numerically, slightly behind that of 1919, due to the late run of the fish and small catches in the traps. In this work we co-operated with the commissions of New Hampshire and Vermont in an interchange of courtesies. It is worthy of comment that the fish which were handled from Vineyard Haven to a distant point in Vermont went through with only two dead on arrival. Similar success attended the distribution to New Hampshire.

The efficiency of the administrative work at the central office was increased by the assignment of a warden to act as messenger-in-chief during the summer. The duties were largely routing shipments going through Boston, assignment and direction of assisting messengers, and other details previously handled by the supervisor of distributions.

The expenses directly chargeable to the distribution of fish are larger than in former years, due largely to the increased tariffs for railroad travel, living expenses and cartage. In 1920 \$6,995.72 was expended for fish distribution. Of this, \$4,832.67 was for support and traveling expenses of messengers,

\$1,817.72 for teaming and carting outside of the Division's own equipment, \$50.19 for ice, and \$295.14 for miscellaneous expenses, which included \$108 for a baggage truck and \$177 for a complete new supply of aërotors to care for fish in transportation.

The liberation of white hares is becoming an important feature of the divisional activities, and the demand far exceeds the supply. This year 1,004 were purchased in Maine and liberated.

The output of pheasants from the game farms was supplemented by the purchase of 1,000 birds, which were distributed from the breeders to the consignees direct, with satisfactory results. The cost of transporting pheasants and hares to applicants was \$640.70.

Acknowledgment is due to the railroad companies for the satisfactory manner in which shipments of fish were handled gratuitously, so long as accompanied by a messenger presenting paid transportation. The express companies likewise assisted in the handling of the game birds and animals. Experience shows, however, that where shipment can be made by automobile and the time on the road reduced, the benefits derived by placing the stock in the open without the devitalizing experiences of a hard trip make this method preferable, even assuming that the cost of either method of transportation is the same.

## Game Distribution during the Year 1920.

COUNTY.	PHEASANTS.			Mallard Ducks.		Black Ducks.		WOOD DUCKS.			QUAIL.			Northern Varying or White Hares.		Gray Rabbit of Nantucket ( <i>Sylvilagus floridanus malinurus</i> ).	TOTALS.		
	Eggs.	Young.	Adults.			Eggs.	Young.	Adults.	Eggs.	Young.	Adults.	Eggs.	Young.	Adults.			Eggs.	Birds.	Hares and Rabbits.
Barnstable, . . . . .	75	264	14	50	26	-	6	-	-	8	-	-	-	42	-	-	75	368	42
Berkshire, . . . . .	465	321	18	32	-	-	-	-	-	-	-	-	-	182	-	-	465	371	182
Bristol, . . . . .	120	334	3	16	-	-	-	-	-	8	-	-	-	54	-	-	120	361	54
Dukes, . . . . .	-	-	-	16	-	-	-	-	-	-	-	-	-	48	17	-	-	16	65
Essex, . . . . .	195	498	9	55	-	-	18	6	-	24	-	-	-	95	-	-	195	610	95
Franklin, . . . . .	150	256	6	24	-	-	-	-	-	-	-	-	-	77	-	-	150	286	77
Hampden, . . . . .	570	260	6	24	-	-	-	-	-	-	-	-	-	101	-	-	570	290	101
Hampshire, . . . . .	255	297	5	32	-	-	-	-	-	-	-	-	-	74	-	-	255	334	74
Middlesex, . . . . .	225	362	9	36	4	-	-	-	-	16	-	-	-	63	-	-	225	427	63
Nantucket, . . . . .	-	22	6	-	-	-	-	-	-	-	-	-	-	29	-	-	-	28	29
Norfolk, . . . . .	285	264	6	52	-	-	8	-	-	8	-	-	-	46	-	-	285	338	46
Plymouth, . . . . .	165	537	6	116	26	-	14	1	-	-	9	-	-	89	-	-	165	709	89
Suffolk, . . . . .	75	24	-	-	-	-	-	-	-	-	6	-	-	-	-	-	75	30	-
Worcester, . . . . .	625	349	19	40	-	-	10	-	-	-	-	-	-	104	-	-	625	418	104
Out of State, fairs and experimental. Sold, . . . . .	247	5	1	-	-	-	-	-	-	-	-	12	-	-	-	-	285	6	-
Totals, . . . . .	3,452	3,793	108	528	56	7	56	7	12	64	15	1,004	17	-	-	-	3,490	4,627	1,021



*Fish Distribution*

COUNTY.	BROOK TROUT.				Silver Trout.	SMALL-MOUTHED BLACK BASS.		
	Eggs.	Fry.	Fingerlings.	Adults.		Fry.	Fingerlings.	Adults.
Barnstable, . . .	-	90,000	3,000	400	60,000	18,000	6,600	-
Berkshire, . . .	-	-	91,700	575	99,500	74,000	-	-
Bristol, . . .	-	-	31,000	650	-	27,000	-	-
Dukes, . . .	-	-	4,000	100	-	-	-	-
Essex, . . .	-	-	67,125	1,050	40,000	12,000	2,500	-
Franklin, . . .	-	-	78,300	625	-	28,000	-	-
Hampden, . . .	-	-	58,400	575	-	26,000	1,250	-
Hampshire, . . .	103,000	-	102,000	650	49,000	36,000	-	-
Middlesex, . . .	28,000	-	94,800	1,075	-	72,000	3,700	-
Norfolk, . . .	50,000	-	50,500	500	10,000	39,000	-	-
Plymouth, . . .	200,000	-	83,000	450	-	18,000	12,300	-
Suffolk, . . .	-	-	-	-	-	-	-	-
Worcester, . . .	24,000	-	141,400	900	50,000	36,000	1,300	-
Out of State, . . .	950,000	-	-	27	-	-	-	24
Totals, . . .	1,355,000	90,000	805,225	7,577	308,500	386,000	27,650	24

during the Year 1920.

Large-mouthed Black Bass (Fingerlings).	Salt-water Smelt (Fry).	White Perch (Adults).	Yellow Perch (Fingerlings).	Pike Perch (Fry).	Horned Pouts.	Chinook Salmon.	Pickerel.	TOTALS.	
								Eggs.	Fish.
7,000	-	3,000	-	500,000	-	21,029	-	-	709,029
-	-	10,800	-	2,300,000	-	-	-	-	2,576,575
-	-	5,100	-	750,000	-	-	-	-	813,750
-	-	2,000	-	500,000	-	-	-	-	506,100
-	9,000,000	7,200	-	500,000	-	202,400	-	-	9,832,275
-	-	6,000	-	600,000	-	-	-	-	712,925
-	-	5,400	250	500,000	-	-	-	-	591,875
-	-	7,400	-	950,000	5,000	5,000	-	103,000	1,155,050
-	-	6,400	-	1,175,000	100	-	600	28,000	1,353,675
-	-	8,400	-	400,000	-	-	-	50,000	508,400
-	20,750,000	8,800	-	650,000	-	10,376	-	200,000	21,532,926
-	-	2,200	-	175,000	-	-	-	-	177,200
-	-	23,800	-	750,000	-	9,500	-	24,000	1,012,900
-	-	16,000	-	-	-	-	-	950,000	16,051
7,000	29,750,000	112,500	250	9,750,000	5,100	248,305	600	1,355,000	41,498,731

**MARINE FISHERIES.****INSPECTION OF FISH.**

In February, 1918, the attention of the Legislature was called to the condition of the fish industry of the State, and a joint special committee was appointed to investigate the industry. The scope of the committee's work embraced inquiry into the methods employed in the marketing of fish; the circumstances affecting the current abnormal prices; the rapid increase in the cost to the consumer; the cold storage of fish as affecting the price thereof; the conditions attending the receipt of fish at the Fish Pier in Boston and the methods of disposing of the same; and the relation of the wholesale to the retail price. The committee was ordered to report its findings, together with such recommendations for legislation or other procedure as it might deem expedient.

By vote of the Legislature, the work of this committee was continued by a joint special recess committee. This committee made an exhaustive study of the whole situation, and in April, 1919, made a report on the conditions they found to exist in the fish industry.

In view of these conditions, and following the suggestions and recommendations embodied in the report of the committee, and with the purpose of effecting a remedy, the Legislature of 1919 enacted chapter 351, General Acts of 1919, providing for the appointment by the Governor and Council of an Inspector of Fish. Pursuant to this act His Excellency on November 5, 1919, appointed Arthur L. Millett as Inspector of Fish. Inspector Millett was for many years connected with the United States Bureau of Fisheries as its agent at Gloucester; he served as fisheries advisory expert to United States Counsel in the North Atlantic Coast Fisheries Arbitration before the Hague Tribunal in 1910; and from 1916 to 1919 was a member of the Board of Commissioners on Fisheries and Game of Massachusetts. His report for the first year of work follows: —

The activities of the office of Inspector of Fish are prescribed in chapter 351, General Acts of 1919. The work in the past



year, by and with the advice of the committee on ways and means and the Supervisor of Administration, has been a campaign of education to acquaint the public in general, and the fish dealers and cold-storage proprietors in particular, with the provisions of the law, and to ascertain what is necessary for its proper enforcement.

The work contemplates the inspection of some 200,000,000 pounds of fresh food fish. This is a tremendous undertaking, which the Inspector will be practically powerless to accomplish unless provided with a reasonable number of deputies, to the end that the full value of the act may accrue to the public and to the fish dealers.

Much time has been given to the situation at the Boston Wholesale Fish Pier and at Gloucester, — the two principal points of fresh fish landings, — as a result of which it can be safely said that the public has already benefited in the way of more good fish and less poor fish placed on the market, and with the prospect that in the not too distant future, with an adequate deputy force at work, fish unsuitable for food will be entirely eliminated not only from stores but even from the trips of the vessels.

#### *Conferences, Meetings and Hearings.*

During the winter at many hearings held with Boston, Gloucester and Cape Cod representatives of the wholesale fresh and frozen fish industries and with leaders of the retail fish business of Boston, the law was analyzed, and all points minutely considered and explained. It was evident that these interests approved the purposes of the act. Tentative regulations for the enforcement of the act were drafted, designed to safeguard the public and at the same time be just and fair to the fish dealers. To acquaint all parties in interest with the proposed regulations, to afford opportunity for public discussion and to secure suggestions, public hearings were held at twenty-seven centers. These meetings were given much advance publicity by the press, and each dealer was provided with a copy of the act and the proposed regulations. Beside these hearings, three general meetings, officially advertised in twenty-two newspapers were held, at Boston, Worcester and Spring-

field, designed to cover the eastern, middle and western parts of the State.

The value of all these hearings cannot be overestimated, and in consequence of good attendance have been a source of advancement in fisheries knowledge. The interest shown was unmistakable. Many dealers openly stated that the act was one long needed not only for the protection of the public but also for the protection of the dealers who desire to do business in a proper manner.

In addition to these general hearings and meetings unannounced visits were made to the retail markets in Boston and elsewhere to study conditions at first hand. At the Boston Fish Pier and at Gloucester study at close range was made of conditions obtaining in the wholesale end of the business. The great interest taken by the fishermen and the wholesale fish dealers of Gloucester and Boston in the act and the plans for its enforcement was shown in a most practical way when the Director of the Division and the Inspector of Fish were officially invited to attend the sessions of the joint conference council, a body composed of members of the Trawlers Owners Association and officials of the Fishermen's Union, who, realizing the unhealthy state of affairs under which the trawling branch of the fish business has been laboring for some time, are bending their best thought and energies to a practical, business-like and permanent solution of their difficulties and differences. At the meeting of that body on November 5, held in Boston, it was clearly stated that the co-operation of the State was desired in the matter of adequate fish inspection, and one of the leaders on each side stated openly that it was practically useless to attempt an amicable solution of the situation unless they could be assured that the State would co-operate with them by enforcing the act. One of the leaders said, "What is needed is inspection that inspects. It will mean everything to the public, to the fishermen and every man in the fish business, big and small."

*Regulations adopted.*

At a meeting of the Division heads with the Commissioner of Conservation on November 18 the proposed regulations were fully and carefully considered and adopted in the following form: —

REGULATIONS UNDER CHAPTER 351, GENERAL ACTS OF 1919, REGULATING  
THE SALE AND COLD STORAGE OF FRESH FOOD FISH.

1. All fresh food fish shall be sorted into three grades before it is offered for sale or placed in cold storage.

2. The grades shall consist of what is known to the trade as "new" fish, "number two" fish and "splitting" fish.

3. The first grade shall include only fish that are known to the trade as "new" fish.

4. Designation for first-grade fish shall be "shore fish" or any other truthful term.

5. The second grade shall include fish other than first-grade fish, which are in suitable condition to be offered for sale as fresh fish.

6. Designation for second-grade fish shall be "number two fish," or "off-shore fish."

7. The third grade shall include all fish which are suitable for splitting or salting or otherwise preserving, but are not suitable for sale as fresh fish.

8. Nothing in section seven shall be construed as prohibiting the use of number one and number two fish for the purposes of splitting, salting or otherwise preserving, as is now the custom.

9. Designation for third-grade fish shall be only "number three fish."

10. The grades of all fish sold by commission men to wholesalers, retailers or others, or by commission men or wholesalers to retailers, shall be clearly and correctly designated on each receipt or invoice, and said receipts or invoices shall be accessible to the Inspector of Fish or his deputies on demand.

11. At the time of sale, or offering or exposing for sale, of "number two" fish it shall be clearly stated, or by suitable designation made known to the purchaser or intending purchaser, that the fish are "number two" or "off-shore fish."

12. Number two fish which are to be designated other than by word of mouth shall be so designated by signs of cardboard or other material equally permanent, bearing plainly written or printed letters at least 1 inch in height.

13. Only fresh fish graded as number one or number two fish may be placed in cold storage.

14. Fresh food fish placed in cold storage, except those deposited in bulk, or in private freezing plants, shall have their containers legibly marked with the date of their receipt.



15. Fresh food fish, deposited in bulk, shall, on their removal, have the containers in which they are packed legibly marked with the month and year of receipt.

16. In all places where fish which have been held in cold storage are sold, a sign bearing the words "Cold Storage Fish" must be conspicuously displayed. This sign shall be of cardboard or something equally permanent, with uncondensed Gothic letters at least 2 inches in height.

17. Fish which have been held in cold storage shall not, in any manner, be represented, or sold, or advertised as fresh fish.

18. Persons purchasing or intending to purchase fish which have been in cold storage shall be plainly notified by the seller that the fish have been held in cold storage, either by word of mouth or by plainly printed or written signs, with letters at least 1 inch in height, conspicuously placed on or in connection with the article so offered for sale.

19. Cold-storage fish shall not be sold or offered or exposed for sale at retail more than forty-eight hours after their receipt by the retailer from cold storage unless they are received by the retailer in the frozen state and sold frozen to the consumer, except, however, that between November 1 in one year and March 31 in the succeeding year halibut, salmon, swordfish, steak cod and pollock may be sold or offered or exposed for sale at retail during one week after their receipt by the retailer from cold storage, and providing they remain in the frozen state until within forty-eight hours of the time of sale.

20. Fish, received for cold storage in this State from any other State or country, which have previously been in cold storage in this State, or which have been in cold storage in any other State or country for over six months, shall not be placed in cold storage until at the time of deposit such fish are plainly marked with the date of their original deposit in this Commonwealth or any other State or country.

21. Every retailer handling cold-storage fish shall secure and preserve both a receipt and invoice for each shipment received, showing the nature of the goods and time received, and the Inspector of Fish or his deputies shall have access to these receipts on demand.

22. Records shall be kept by each and every cold storage concern showing the time of receipt of any and all fish in cold storage which have previously been in cold storage in this Commonwealth or any other State or country for a period exceeding six months, and such records shall be made accessible to the Inspector of Fish or his deputies on demand.

### *Aims and Need of Fish Inspection.*

The following paragraphs are designed to explain concisely the provisions of the act, to point out cases where the law is disregarded to the disadvantage of the public, and to emphasize what is hoped to be accomplished by its enforcement: —

It is elemental that good food preserves and protects the

health of a nation. It is fundamental that the better the condition of a food staple the more of that staple will be consumed. The consumption of fish in the United States is pitifully low as compared with England and several other European nations, and this in spite of the fact that the fishing resources of this country are equal to any. Several reasons have been presented for this state of affairs. Inadequate and slow transportation and poor handling of catch are the two most commonly brought forward, but the main reason has been generally overlooked, — the failure to supply only *good* fish to the consumer. If the same care were taken with the marketing of fish food as with beef and canned products, the yield of our farms of the sea, lake and river would now be vying for supremacy with land-food commodities instead of running back among the unplaced. Beef and canned vegetable products are subjected to stringent inspection, and the result, from the standpoints of health and increased and increasing consumption, is apparent to all. If inspection has done this for beef and canned goods, why cannot a proportional measure of good results be thus obtained for fresh and salt fish foods? It is contended that it can.

Fish cannot come out of cold storage in any better condition than it is put in. The sudden cold blast and freezing of fish can work no miracle. Fish in the retail store cannot be strictly fresh if it is second or third grade when shipped by the wholesaler. Salted fish which was in poor condition when split, salted and boxed will not be "Prime Georges" or "Selected Bank" when it reaches the table, even though plentifully treated with boracic acid and every bone pulled.

#### *Fish Inspection the Solution.*

Inspection which follows the fish from the time of landing on the wharf until wrapped up by the market man is the solution of these "poor fish" troubles. Fish inspection that actually inspects will mean that the public will have the opportunity of buying only good fish. With this accomplished, then, and then only, may we look for the per capita consumption of fish in this country to increase. The new law, designed to accomplish this end, combines health, economic and anti-

profiteering features, and has to do basically with furnishing the public with the opportunity of buying only good fish and with knowing exactly what they are buying.

Three fundamentals have long handicapped the more extensive use of fresh and frozen fish, — poor transportation, the sale by some dealers of fish of an inferior and at times unfit-for-food quality, and the seeming reluctance of a considerable portion of the public to grasp the fact that fish is of equal food value with meat and much cheaper.

If the public mind can be educated to understand that in buying its fish dinner it is buying only good fresh or frozen fish and that the dealer is, under the law, not allowed to expose for sale fish unfit for food (as in the past has too often been the case), and also that the dealer is obliged by law to indicate truthfully to the purchaser what grade and what species of fish he is buying, a state of confidence will be set up in the minds of the buying public, with the inevitable result that fish as a food staple will come into its own. This is the groundwork of the act. It should be emphasized that this new law imposes no burden. It does, however, protect the public and the honest dealer. Because it will lead to increased consumption of fish, it will be a direct financial benefit to the dealer, and also by reason of some of the provisions cannot fail, it would seem, to make several lines of fish cheaper than at present to the consumer.

The salient points of the bill, which affects both wholesale and retail dealers in fresh and frozen fish, and, in a lesser degree, dealers in salt fish, are: —

All fresh food fish must be divided into three grades before being offered for sale or placed in cold storage. The first is to be known as "new fish," the second as "off-shore fish," and under the law "fish of the third grade shall include all fish which are suitable for splitting or salting, but are not suitable for sale as fresh fish." Fish of the third grade may not be sold at retail for food. This provision of the law, while perfectly proper as far as the enforcement is concerned, is very misleading, giving one the idea, as it does, that only fish of the third grade are used for splitting or salting or otherwise preserving. This, of course, is far from the fact, for fish used



for these purposes frequently includes whole trips of the very newest fish, and generally fish of the "off-shore" grade.

Only fish of the first two grades may be placed in cold storage or offered for sale at retail for food.

The law provides for the designations of fish of the various grades, and also that only truthful terms shall be used in the designation of the fish represented to the consumer. The foregoing regulations putting the law into effect are in line with the best practices which now obtain in the business.

### *How Fish are masqueraded.*

A considerable quantity of fish which appeared to be below standard was observed, and also little or no attempt to distinguish between the grades has been noted, both as to price and quality. This is more noticeable in markets of the cheaper class than in others. In many types of market, however, there has been seen what may be termed evasion, at least, of truthful terms. For instance, the lowly pollock is masqueraded as "Boston Bay Blues," and is in some cases baldly and boldly labeled "Bluefish." Catfish, because of the close affinity of its designation to the name of the despised dogfish and its own none too pleasant personal appearance, appeared nicely skinned and steaked, on clean white platters, and temptingly marked "Whitefish." Naturally the buyers think it is the whitefish of the Great Lakes. In some markets Pacific halibut masqueraded as eastern halibut, and Pacific salmon as eastern salmon. There is no question in these two cases as to the quality or fitness for food, but the unlawful substitution means to the purchaser a difference of from 5 to 10 cents a pound, the Pacific fish costing the dealer less in both instances. And herein lies the economic value of the new law. These few cases are cited merely to show what this law, properly enforced, can abolish to the benefit, financial and otherwise, of the consumer, and this without detriment in any way to the honest dealer.

### *Progress already made.*

Already the new law is proving its worth. The campaign of education has aroused much interest and has been strongly taken up by the press. Many of the leading dealers, particu-

larly among the wholesalers, have shown a splendid readiness to co-operate. Masquerade titles for fish are being eliminated from the weekly price lists of many large concerns. A lesser amount of No. 3 grade fish is being handled by the splitters, and also the great salt-fish concerns are already planning to handle little or no third-grade fish next season. The importance of this is far-reaching, and its value to the public cannot be overestimated. Pollock, properly labeled, are appearing in the markets, and recently there was observed in the show window of a large retail market, where generally the platter of "Whitefish" was wont to appear, a large catfish, head, skin, tail and all, calmly reposing on a cake of ice, and actually tagged "Catfish."

In compiling a list of the dealers of the State, the amazing fact was disclosed that out of the 354 cities and towns over 125 had no fish markets, no fish dealers or peddlers from other towns; in short, the people of practically one-third of the towns of the greatest fresh and salt fish producing State of the country were without opportunity of buying fresh fish. This astonishing fact was brought to the attention of a gathering of Boston Fish Pier dealers, and a comprehensive plan to remedy this situation is now under consideration.

#### A FISHERIES COLLEGE.

On September 16, at a gathering of representative fish dealers assembled to meet Prof. John N. Cobb, Director of the College of Fisheries of the University of Washington, the initial steps were taken which may result in the establishment in Massachusetts of a college of fisheries.

Professor Cobb, at the request of the gathering, outlined at length his work in the Washington university, emphasized the value a similar institution would be to Massachusetts and her fishing industry, and suggested methods of procedure.

He defined the purpose of such an institution as not to make fishermen, but to turn out fish executives, — men who, through gaining a basic knowledge of the many sides of fishing and the fish business, would be competent to take charge of any large fish concern or any unit thereof. He claimed that a young man who can successfully complete such a course is the

sort of a man that is sorely needed in the fish business world to-day, and for whom the big men of the fish world are eagerly looking.

Such a course would require the student to delve deep into the scientific as well as the practical things which come up daily in the business, and to acquire actual experience on fishing vessels, in fish canneries, fish lofts, the counting room, etc. He made it plain that, while a fisheries college course meant hard work and plenty of it, on its completion the graduate could face the world fitted for this work from every angle, — to operate a plant; to deal with the big general problems of the development of business as a whole; to handle the problems of distribution, preservation and storage, and of educating the people to eat more fish. In his store of knowledge would be the profitable handling of by-products; administration of enterprises; the actual catching of fish and preparation of it for market, either by the fresh, frozen, canned or cured methods; sales methods; merchandising and fish propagation; besides the scientific knowledge of fish and fish species gained by research work in the laboratory.

Following a general discussion of Professor Cobb's remarks, a volunteer committee was formed to take up immediately the work necessary to pave the way for a college of fisheries in Massachusetts. The Division of Fisheries and Game is represented on the committee by Director Adams and Inspector of Fish Millett.

The committee has been in correspondence with President Lowell of Harvard, President Murlin of Boston University and Professor Prescott of the department of biology of the Massachusetts Institute of Technology. The latter has mapped out for the committee tentative plans for a four-year course and also for shorter courses for presentation to the Technology board of directors. In its efforts to secure the foundation of this fisheries school the committee expects to have the endorsement of not only the general fish industry of the State and its allied organizations, but also of the United States Bureau of Fisheries and the boards of trade and chambers of commerce in the localities where the fishing industry is prosecuted.



## THE FISH INDUSTRY.

The varying fortunes which various branches of the Massachusetts fisheries and the fish business of the Commonwealth experienced during 1920 have had such an important effect upon the business as a whole that this Division has secured from acknowledged authorities an expression of opinion as to the reasons for conditions in the special lines of the fish industry.

Letters were addressed to Thomas J. Carroll, general manager of the Gorton-Pew Fisheries Company of Gloucester, Gardner Poole, president of the Commonwealth Ice and Cold Storage Company of Boston, John C. Wheeler of the Bay State Fishing Company of Boston Fish Pier, and Irving M. Atwood of the Freeman & Cobb Company and Consolidated Weir Company of the Boston Fish Pier. From these gentlemen valuable information was obtained as to the salted, cured and pickled, cold-storage and fresh fish, and trap, weir and freezer ends of the industry, and because of their high source these statements can be taken as authoritative.

Speaking of conditions in general and of the salt-fish industry in particular, Mr. Carroll writes:—

Referring to the situation of the salt-fish industry during the past year and the offering for the future, I am sure it is unnecessary to state that the past year has been a very unprofitable one for the industry.

As a whole, the cost of producing fish has been mounting during the past years without a corresponding increase in the value of the products of the fisheries. The cost of vessels, together with the cost of material, such as seines, ropes, gear of all kinds, provisions, etc., has increased to such an extent during the past few years that it has been almost impossible to operate the vessels profitably. Had the price of fish ex-vessel increased in proportion, the result would have been different, but with the exception of an occasional trip which brought high prices the proceeds of the trips have been disappointing.

The trouble with the fish-packing industry has been largely due to the collapse of the export business, brought about largely through the very unfavorable situation in foreign exchange. Inasmuch as the export fish business has been a very large part of our business, it was a very serious thing when this business went down as low as it has during the past year. The domestic boneless fish business has been very good considering the unfavorable conditions in general business throughout the country.

The mackerel business last year was a great disappointment. Up to the 4th of July the catch was very good, in fact, the best within recent

years, but after the 4th of July it was a complete failure. The halibut vessels had a good season, which was due largely to the high prices they got for their halibut. Had the price of ground fish increased in proportion to the price of halibut the vessels would have had a profitable year.

While at present conditions in the fish business are not very good to say the least, there are some plans that the dealers have in mind that I feel will be helpful.

We have every reason to believe, also, that the cost of operating the vessels will be lower the coming year, and that, of course, will help materially to put the business on a profitable basis. Another favorable factor in the business is the cordial relationship that exists now between the owners and the fishermen.

We find that the men who go in our vessels are anxious to co-operate with us in the improvement of the quality of their product. They realize as well as we that it is very important that the quality of fish produced be as high as it is possible to make it.

I sincerely believe that with the co-operation of the fishermen who man our vessels the business will be put upon a substantial basis so that both the men and owners will find it profitable in the years to come.

As to traps, weirs and freezers, Cape Cod's great end of the industry, Mr. Irving M. Atwood writes: —

Our impression of this year's situation is that the traps did as poor work as they have for a number of years and that the same is undoubtedly true of the freezers. Most of them were unable to start until late and could not get many fish. The fish that they did get were mostly the whit-  
ing, on which at the present time there seems to be little or no market, due, in part, to the continued open weather and the large runs of herring and blue pike in the Great Lakes, which have shut off considerably on our market. This outlines the situation in a general way.

I will say that we have taken our traps, representing fourteen separate bowls or pounds, and we find that up to November 1 the comparative stocks are: 1918, 55,367; 1919, 55,001; 1920, 31,976.

As regards the freezer, we find that for the same three years the number of pounds of fish that we have put in the freezer up to November 15 is as listed below, which gives a good idea of how poor this year has been compared with former years: 1918, 2,245,335; 1919, 1,757,636; 1920 1,268,474.

We think that our freezer is typical of general conditions on the Cape.

Writing as to refrigeration as applied to the fisheries, Mr. Poole says: —

Since 1890 mechanical refrigeration has assumed great importance and there is no greater asset in the all-important subject of food conservation than refrigeration, and from the precooling plants of the producer to the

family refrigerator of the consumer it is a vital necessity in these modern times.

The value of cold storage is particularly noticeable in the fish industry, where conditions affecting production tend toward creating immense surpluses and at times extreme shortages. During the periods of heavy production, except for the fact of cold storage vast quantities of fish would go to waste, and without such conservation many varieties of fish that are extremely seasonal in character would not be available during times of extreme shortage, and a much higher annual level of prices would be the result.

With the advent of the beam trawler, method of fishing a larger and more constant production of ground fish is more noticeable, and as this supply is available twelve months in the year, the necessity for conserving these varieties in cold storage, except in a somewhat limited way, does not now exist, and for this reason there is a tendency to divert the surplus of this production to canners, salters and smokers. The need, however, for conserving in cold storage the surplus production of fish that is seasonal in character is increasingly important. The broadening out of the market through the introduction of Atlantic coast fish in various western markets is stimulating the demand for all kinds of fish, and recent statistics indicate an increased per capita consumption for the whole country.

The Bureau of Markets monthly reports of cold-storage holdings in the United States furnish valuable data by which we can make some interesting comparisons. At the period of peak load in 1919 the total holdings of fresh fish for the country were approximately 76,700,000 pounds, and at the same period in 1920 the total holdings were about 62,000,000 pounds, showing a decrease of 19 per cent. This condition is reflected in the New England district, where the percentage of decrease is even more marked, and where about 30 per cent of the entire holdings of frozen fish in the country are held.

The reports show a total in storage in New England at peak in 1919 of approximately 27,000,000 pounds and the total in the same period of 1920 approximates 21,000,000 pounds. This decrease is represented almost entirely in the whiting pack on Cape Cod and in the pack of frozen herring in the New England district. The pack of the former showed a decrease, probably on account of the fact that many of our freezing plants on Cape Cod have not been operating and others have been operating only on a very limited scale. The decrease in the pack of herring, however, is due almost entirely to the shortage in the run of this variety during the entire season.

The pack of all other varieties of seasonal fish is about normal and conditions in the industry appear to be sound; and a feeling of encouragement and security exists among the trade notwithstanding the fact that weather conditions up to the present time have curtailed the shipment of these goods from points of production into distributing markets; and also a disposition on the part of large purchasers at distributing points to be



somewhat overcautious, due probably to rather serious complications which have contributed to heavy losses in the industry during the past two years.

While it is a fact that the trade usually welcomes normal weather conditions to assist in the lining up of market conditions, and it would perhaps seem that last winter with its extremes and severe weather conditions would be ideal, there are extremes in both directions; and last year in particular, with the heavy snowstorms which demoralized the transportation and traffic facilities almost entirely, the producers were unable to move their goods up into distributing markets freely during the time when they could have been most readily disposed of; and as these conditions were prolonged so far toward the end of the season, the product was dammed back, and in many instances a portion of the stocks was not moved at all.

Under the caption "Boston Fresh Fish Market," Mr. Wheeler writes: —

The importance of the fresh-fish industry to Massachusetts and the port of Boston is not fully realized by the citizens of the Commonwealth.

A synopsis of the industry for 1920 brings to light the following interesting facts: —

That the receipts of fresh fish landed at Boston for the calendar year 1920 exceeded any previous year in the history of the industry and gave the surprising total of 3,342 arrivals, — 123,402,060 pounds, a gain of 7,600,000 pounds over the previous record year of 1919.

The year was notable for continuous operation of fishing vessels, no strikes or other causes of interruption as in previous years, except laying up due to surplus.

The decision of the United States Court was put into effect and two large holding companies were dissolved into their original units, and it speaks well of the industry that these changes took place without undue disturbance of business and that no failures occurred in the readjustment.

The New England Fish Exchange was also reorganized, new by-laws adopted and its membership enlarged to include any buyers meeting the modified requirements.

Notwithstanding the large catch the producing and price conditions were most unfavorable during the greater part of the year, due to several causes: —

1. Heavy catches during the summer months, thus producing surpluses which drove prices down to pre-war levels.

2. Lack of demand from salt-fish industry for surpluses during period of heavy production, due to heavy stocks and stagnation in that branch of the industry. This condition helped to force prices to lower levels.

3. Heavy increase in expenses for operating all classes of fishing vessels. Never in the history of the industry, not excepting war years, have costs been so high for all items making up expenses for fishing vessels.

4. The labor awards affecting the steam trawler fleet, granting wages greatly in excess of previous wages, went into effect March 1, 1920, and, together with the high price of coal, ice, food, nets, repairs, practically caused the trawler fleet to tie up for the summer as market prices were below the cost of production.

5. The schooner fleet which produce upwards of 50 per cent of the total catch were not affected by the award of wages and continued as of old on a share lay, and therefore were better able to continue with the conditions existing.

6. An important factor not to be overlooked was the advent on Jan. 4, 1920, of a large producing company operating from T Wharf, and as this company was capable of great production, but had not established or opened new markets of distribution, its operations had a marked influence on the price situation in large distributive centers and operated as a great detriment to the old-established concerns at South Boston. The instability of the organization was demonstrated when on Dec. 1, 1920, it passed into the hands of receivers and T Wharf was closed. The operations of this company also had a direct influence on the salt-fish industry, causing overproduction, glutted markets, etc.

With the coming of the fall and winter months the trawler fleet gradually increased operations, and, on December 30, 17 trawlers were operating from the port of Boston, with the schooner fleet greatly reduced, as is customary each year in the winter season.

The members of the industry — hard-working, optimistic — approach the new year with the feeling that the turning point was passed in 1920, and with deflation in expenses and supplies, — coal, oil, ice, and to some extent cheaper labor, — and with more stable prices, due to probably lesser production, that they may be rewarded with at least the reasonable profit to which the marketing of a super-perishable article should entitle them for 1921.

### *The Deep-sea Fisheries.*

The fortunes of the fleets engaged in the various branches of fishing varied. Taken as a whole the catch of Massachusetts crafts will vary considerably from the total of 1919, and because of average lower prices, the financial returns to the fishermen and fish dealers will be less.

*Fresh Fishing or Haddock Fleet.* — The fresh fishing or "haddock" fleet had a good winter and a rather poor summer, but in the fall started to do well again, the better demand for fresh fish making a widened market and better prices to the fishermen. Although the winter of 1919-20 was unusually severe, with a succession of heavy storms, and weeks on end it was impossible to set a trawl, the hardy haddockers

took all kinds of chances to earn the big money which awaited their trips, with the result that their landings up to April 2 actually exceeded the record of the fleet for the previous winter. After this the catches fell off so that the previous season's record was not again touched until the middle of July, when it was gradually passed, until on August 20 this year's figures were a full 10,000,000 pounds to the good. The great gain was made from July 4 to August 20, the time when last year the whole fleet was tied up by the fishermen's strike. The figures are interesting as showing the loss to the fleet by the strike. Had the whole fleet been operating this summer the variance of the catch would have been greater, but it was minus the services of the great bulk of the steam trawler fleet, which, even with capacity fares, could not operate and pay expenses, owing to high cost of repairs, replacement of gear and running parts, and wages of officers and men as compared with reduced prices received for their fish. All the Gloucester steam trawlers, with one exception, were hauled up, one-half of a big Boston fleet likewise, several independent crafts hauled off, and of the largest fleet of all, some 22 crafts, only two or three were kept in commission. Had this whole great fleet been in operation all the summer and fall, the fresh-fish catch of 1920 would have reached unheard-of heights. As it was, the summer for the crafts which tended market at the pier was nothing to enthuse over; indeed, seldom has the fresh-fish business endured a duller spell, and this, of course, was reflected in the returns to the fishermen. So taking a good winter with a poor summer season the haddocking year at best can only be called an average one.

*Swordfishing Fleet.* — An example of great prosperity is furnished by the record of the swordfishing fleet. It was only a few years ago that but few people could be induced to eat swordfish, and consequently few found their way to market. Gradually the change has come, until to-day, even with a large fleet in operation, it is almost impossible for the receipts to keep pace with the demand. The fleet this year was the largest ever, numbering about 50 sail running to the fish pier and as many more smaller crafts landing at other Massachusetts ports, and the catch is without doubt the largest in



the history of the business; yet with all the large receipts there was but one day at the Boston Fish Pier when there was really a "glut" of these fish. The season opened on June 29 when schooner "Lafayette," Capt. Joseph Mello, arrived at the Boston Fish Pier with the first fare of the season, 57 fish, which sold at 30 cents a pound. From this time on through the summer and early fall a steady stream of crafts to the fish pier from Georges brought in good fares. Some idea of the amount can be gleaned from the statement that for the week ending August 5 the receipts of swordfish at the Boston Fish Pier numbered 2,843 fish, the record up to this time. To give an idea of the money made by the sword fishermen, we mention that schooner "Ethel Marian" of Edgartown arrived at the Boston Fish Pier, September 7, hailing for 89 swordfish, on which the stock of \$5,770 was realized and each of the crew shared \$605.60 clear for their two weeks' work. October 1 found the fleet all home and the season over, the late arrivals bringing small fares which brought very high prices.

*Salt Bank Codfishery.* — With but half a dozen vessels out of Gloucester and none out of Boston or Provincetown engaged in the salt bank codfishery, including both trawl and dory handline crafts, this once greatest staple branch of the fisheries seems but a memory. For several years past the fleet has been dwindling, and, with the gradual trend toward fresh fish and the broadening of the markets for the latter, vessels have gradually been withdrawn from the branch once known as the "backbone of the fisheries," until now a salt banker is almost a curiosity. This year the vessels of this fleet did pretty well on their first trips, but the second trips were not up to the average. The price, too, showed a drop from war figures, so with possibly one or two exceptions the season was not especially remunerative.

*The Shacking Fleet.* — The "shacking" fleet, comprising many of the large vessels of the winter haddock fleet of Boston and Gloucester, which, beginning in the late spring and continuing until early fall, fishes on the banks to the eastward of the sixty-sixth parallel of longitude, generally coming home with capacity fares of lightly iced fish intended for the splitting

and salt-fish concerns, enjoyed a good season; indeed, it is figured that they landed more fish than in the prosperous season of 1919. True, prices as a whole did not hold up with last season, but large fares were the rule, and even the lowered prices were above the average of past years, so that, all in all, the returns were good.

In the main the operations of this fleet were confined to Western and Sable Island banks where good fishing was found generally throughout the summer months. Some of the crafts during the latter part of the season carried some salt besides their ice, thus salting their early catches and icing the last week's fishing.

*Salt or Flitched Halibut Fishery.* — None of the fleet engaged in the salt, or flitched halibut fishery the past season, two years thus passing without a craft in this branch of the industry. A voyage of this nature is quite a venturesome one, the fishing grounds being located off Labrador, Greenland and Iceland. The demand for smoked halibut is large, and there is some talk of a vessel going at this line of business next season.

*Fresh Halibut Fleet.* — The fresh halibut fleet has enjoyed another big season, equaling or exceeding the phenomenal year of 1919 as to catches and financial returns. In this connection should be noted what seems to indicate the passing of Gloucester as a fresh halibut market port. For many years this port was the one market for fresh halibut, and some years ago when the vessels first resorted to the Funks and Bacaliew bank off the upper Newfoundland and Labrador coasts for halibut, one morning alone found nearly 1,000,000 pounds awaiting market in the holds of vessels that had arrived overnight. In these days, when 2,000,000 pounds would be considered a large year's work for the whole halibut fleet and the total year's landings at Gloucester the present year are only 160,392 pounds, while Boston is credited with 2,482,266 pounds, it is easy to see the great change that has come over this branch of the fishery and how Boston has absorbed the preponderance of the catch. Again, on the big halibut day at Gloucester above mentioned, from 3 to 5 cents a pound was the usual price for Funks fish, some even going to split, while this year the average price per pound for all halibut landed will go better

than 20 cents per pound. Comparisons like this bring a realization of the changes that are constantly going on in the fisheries and the fishing business. It is to be noted that while the bulk of the halibut were taken on Georges and Brown's banks, a goodly number of fine fares were secured on the banks to the eastward, all the way along from Western to Grand Bank, including trips from Quero, The Gully, Green and St. Pierre banks. Last year practically the whole catch was taken on Georges. This is considered a hopeful sign by the skippers that halibut are increasing and are returning to many of their old and favorite habitats. The fleet this year was of good size, and with vessels fishing on the several banks it gave the captains a better chance to keep run of the movements of the fish than if all were fishing on Georges, and may encourage some to continue all winter instead of hauling up in November and starting again in March as has been the general custom now for several years.

*The Gill Netting Fleet.* — The gill netting fleet, comprising some 35 sail of little steam and gasoline propelled craft operating daily trips out of Gloucester, their catches being shipped to Boston by steamer or motor truck in time for the opening of the next day's market, did not share in the prosperity of some of the fleets engaged in other lines of fishing. The almost continuous succession of winter storms which swept the coast hindered them greatly, and fish were scarce, the shore schools of pollock and haddock failing to materialize. Consequently many hauled out early. During the summer most of the larger crafts of the fleet engaged in mackerel seining, but as these fish were scarce on the shore grounds, their catches were not large as a whole, though individual crafts did well. Then, too, the spring and summer schools of herring, shad and bluebacks failed to appear in any quantity and thus their opportunity for making a paying season in this direction was spoiled. In October the fleet began to fit out again with their gill nets, expecting and hoping for the pollock to come along in the usual large quantities as in 1918, but up to this writing the catches have not been as large as hoped for.

*Small Craft.* — The story of the small boat fleet, including the Italian motor-powered fleet of Boston and Gloucester, — the



latter together numbering fully 100 crafts and manned by indefatigable fishermen, from two to four to a boat,—is on a par with the story of the gill netters — a poor season, and for the same reason—bad weather during the larger part of the winter and a lack of both school and ground fish on the shore fishing spots during the remainder of the season.

*The Flounder Fishery.* — The flounder draggers, numbering fully 50 sail, which operate during the winter months off Gloucester and Cape Cod, the major part landing their catches at ports at the latter place, had a good season. The Gloucester landings, which were small compared with the Cape Cod catches, were shipped to the Boston market, while the bulk of the Cape Cod receipts were marketed at Fulton Market, New York.

*The Mackerel Fishery.* — The vagaries and uncertainties of fishing were never better illustrated than by the mackerel season of 1920. It opened poorly out south, the fleet being hampered by bad weather and light nights at the start; then took a spurt of unusual dimensions just before the vessels were ready to leave for the Cape Shore and ran up a total catch not exceeded in recent years, at least in the southern fishery. Then, when hopes seemed brightest on the Cape Shore, “the backbone of the season” as it is often called, this fishery showed only 50 per cent of last year’s catch and made the smallest catch returns since 1916. The season’s total catch was then, however, well ahead of last year, but the brilliant promise of late May and June failed of fulfillment. However, to retrace a bit, the fleet of netters that went south after the seining fleet, had been doing extraordinarily well, and some of the seiners which did not go to the Cape Shore had continued to land catches from the schools to the southward, so that as soon as any of the vessels arrived home from the Cape Shore they hustled out to the fishing ground to the southward of No Man’s Land, Block Island and South Shoal lightship and here revelled in plenty of fish until the middle of July, when suddenly the fish disappeared.

The late southern spurt, from May 14 to 28, had netted 20,000 barrels, while the spurt following Cape Shore (the fish being taken in the same locality, from the southward of Block Island to the South Shoal lightship) registered 29,000

barrels in three weeks, from June 18 to July 9, and then in another week the fish disappeared and the fleet were scurrying hither and thither attempting to locate them. It is well to note here that in a fishing season of almost seven months, during which time the fresh mackerel catch was approximately 79,000 barrels, that 49,000 barrels, or over half the catch, were taken inside of five weeks and all in the same locality, from the southward of Block Island and No Man's Land to South Shoal lightship. There could be no better example of the "lottery" of the fishing business.

The mackerel season was so unusual as to demand some definite record of its progress. It opened with the report brought into Lewes, Delaware breakwater, March 30, by a pilot boat, of two schools seen that day off Cape Henlopen, followed by the catching next day of the first mackerel of the season in a trap at Chincoteague, Va.

The Gloucester and Boston fleets began to fit out, and the advance guard, schooner "Squanto," sailed from the former port on April 7, followed the next day by seven more of the fleet. Others got away daily, until inside of two weeks practically the whole fleet of about 30 sail were searching the southern grounds for fish as far south as the capes of Virginia.

The coveted honor of landing the first trip went to Capt. Ralph Webber in schooner "Stiletto," which put in at Cape May, April 16 (five days ahead of the earliest arrival of 1919), with 24 barrels (3,600 pounds) of large size fresh mackerel, caught in 35 fathoms of water off Winter Quarter lightship. The fish sold readily at Fulton Market at from 50 to 65 cents per pound. From then on the seiners met with indifferent success, while the story of the netting fleet, which got into action early in May, was one of great prosperity throughout its season into June.

Up to May 21 the mackerel fleet as a whole had landed but 7,000 barrels of fresh fish at New York and Newport, R. I., against 14,000 barrels for the same period of 1919. The seiners had become divided into two fleets,—one far to the southward, and the other well up the coast,—both working on fish which were wild and hard to catch. Then, too, the seiners were hampered by a long spell of stormy weather and

light nights, which latter condition of course worked greatly to the advantage of the netting fleet.

After May 14 came the big strike to the southward of Block Island, which turned a failure into the biggest southern success in recent years. This was followed by the rather indifferent trip to the Cape Shore, but the latter was forgotten when the fleet on arrival immediately fared south again and struck on the fish schools they had left a month previous and which had spread out now to include the South Shoal lightship ground. Soon the whole fleet congregated on the latter ground, and there another school of fish put in appearance — small and medium fish averaging 2 pounds — thought by many of the skippers to be the body of fish which some of the fleet were working on far to the southward during the early part of the southern season.

Here, then, for three weeks the fleet did unusually well. So many and so frequent were the trips that the fleet divided in landing, some going to Boston, others to Newport and New Bedford, and some even ran to New York. By July 9 this grand spurt was practically over, but so great had been the returns that, despite the fact that the fresh Cape Shore catch had been but half that of last year, the total was 66,345 barrels against 38,995 barrels up to the same date of 1919. Veteran fishermen called this Block Island-South Shoal spurt the greatest on record; and with this splendid start, as shown by figures, big stocks and shares, small wonder that everybody was looking for the season 1920 to be a record breaker.

But here the scene changed, for inside of a week the fleet was spread out in every direction hunting for fish; and thereafter to the end of the season, in November, the weekly catches, instead of being figured in thousands and tens of thousands of barrels, were figured by hundreds and in some cases almost by the figure zero.

A few fish were found after this on Georges, but there was no body to the schools. The situation became so discouraging that the aid of the United States Bureau of Fisheries was sought, and that bureau, about the middle of August, sent out its steamer "Halcyon," in charge of a competent mackerel skipper, Capt. Elroy Prior, to attempt to locate the missing



schools. The craft made a big swing around the circle, taking in the southern and shore grounds, Georges, Bay of Fundy and the western end of the Cape Shore, but returned early in September with the discouraging report of no schools located.

Late in August and early in September some schools were taken off Chatham, but here, too, the fishing quickly played out. A little later some schools of small fish were taken on Georges, followed by a few catches off Race Point, and while small hauls continued to be made off Chatham, the fleet, as a whole, was doing practically nothing but chasing reports and thoroughly searching every well-known mackerel fishing ground in vain.

Early in October mackerel were reported schooling on the Cape Shore, and some of the fleet hustled down there. They met with blowy weather, though some fish were seen, and a few trips were secured, taken off the eastern end of the Cape Shore and also off Liverpool, and landed fresh in Boston. Late in October the netters or "draggers" operating out of Gloucester and Rockport started operations, fishing off Thatchers and on Middle Bank, and met with fair success, continuing operations up to the last of November with no signs even then of abatement. The seven seiners which had been operating on the Cape Shore arrived home before that and hauled up; and the mackerel season of 1920, which at one time early in the season gave promise of breaking all records, ended in a disappointing manner, although the catch of 1919 was left some 24,000 barrels behind on fresh fish, the latter season, however, being 2,000 barrels ahead on salted mackerel.

Nothing could better illustrate the uncertainties of fishing than this story of the doings of the mackerel fleet of the season of 1920.

The Massachusetts catches of fresh and salted mackerel from Dec. 1, 1919, to Nov. 30, 1920, inclusive, and for the corresponding period of the previous year, were as follows: —

	Dec. 1, 1919, to Nov. 30, 1920.	Dec. 1, 1918, to Nov. 30, 1919.
Salt mackerel (barrels), . . . . .	4,897	7,007
Fresh mackerel (barrels), . . . . .	79,799	55,375
Totals (barrels), . . . . .	84,696	62,382

*Cape Shore Catches of Mackerel for Five Years.*

YEAR.	Arrivals.	Fresh Mackerel (Pounds).	Salt Mackerel (Barrels).
1920, . . . . .	30	1,290,000	3,217
1919, . . . . .	32	2,119,000	6,275
1918, . . . . .	38	1,689,000	7,558
1917, . . . . .	32	2,229,000	7,131
1916, . . . . .	24	1,161,000	3,718

*Cape Cod Fishery Activities.*

The Cape Cod fisheries for 1920 were, with few exceptions, unsatisfactory as compared with recent years. At Provincetown the larger fleet of small auxiliary powered craft that make daily trips did poorly all summer. The larger fleet, some 40 sail, of flounder draggers that makes Hyannisport its headquarters had a good season both before and after the midwinter freeze-up.

The catches of the traps and weirs along the shore were the smallest for several years. Prices of gear and twine were very high, and it is doubtful if many paid expenses. The run of whiting and herring was not large, in fact catches were poor the whole season. Few squid were taken, and the freezers fared accordingly. On the date to which this report is made (November 30), it was estimated that the Provincetown freezers are from one-half to three-quarters full on the average, mostly herring and whiting; the Chatham freezer had stored but 1,500 barrels of whiting, while the Yarmouth freezer was closed. The Sandwich freezer was reported about full of whiting and herring.

*Boston Fishery Activities.*

While the report for Boston for the fish year shows the largest landing of fresh fish in its history, yet despite this splendid showing of catch the year has been anything but satisfactory to the owners of vessels and fish producers on the Boston Pier, for the reason that many times it has been necessary to sell the fresh products, in order to move them to the various markets of this State and outside of the State, at a figure really less than it cost to produce the fish.

The following table will give in detail the catch for the port of Boston for the year (Dec. 1, 1919, to Nov. 30, 1920): —

Large codfish (10 pounds and over), . . . . .	19,394,030
Market cod (those under 10 and over $2\frac{1}{2}$ pounds), . . . . .	11,987,845
Cod scrod (those weighing 1 to $2\frac{1}{2}$ pounds), . . . . .	160,363
Haddock (over $2\frac{1}{2}$ pounds), . . . . .	64,813,008
Haddock scrod (1 to $2\frac{1}{2}$ pounds), . . . . .	48,166
Large hake (6 pounds and over), . . . . .	694,176
Small hake (under 6 pounds), . . . . .	1,647,788
Pollock, . . . . .	2,973,941
Cusk, . . . . .	617,198
Halibut, . . . . .	2,482,266
Fresh large mackerel (over $2\frac{1}{4}$ pounds), . . . . .	4,505,025
Fresh medium mackerel ( $1\frac{1}{2}$ to $2\frac{1}{4}$ pounds), . . . . .	1,312,837
Fresh small mackerel (under $1\frac{1}{2}$ pounds), . . . . .	339,738
Miscellaneous (butterfish, catfish, flounders, redfish, shad, smelt, herring, sturgeon, etc.), . . . . .	6,912,413
Total, . . . . .	117,888,794

In connection with this it might be interesting to note the table for the previous two years. While giving the totals in each line, it does not give the catch in each especial size of fish landed as explicitly as does the one for this year. Nevertheless it will be found of great value for comparison: —

	Dec. 1, 1918, to Nov. 30, 1919.	Jan. 1, 1918, to Nov. 30, 1918 (Eleven Months).
Codfish, . . . . .	32,265,992	36,457,622
Haddock, . . . . .	61,504,416	47,752,660
Hake, . . . . .	2,860,160	2,330,643
Pollock, . . . . .	3,846,345	4,130,341
Cusk, . . . . .	795,646	981,665
Halibut, . . . . .	1,353,704	734,992
Mackerel, . . . . .	4,000,513	6,412,715
Miscellaneous, . . . . .	4,559,830	4,840,002
Totals, . . . . .	111,186,606	103,640,640

The figures for the preceding tables are furnished, as in previous years, by Mr. F. F. Dimick, secretary of the Boston Fish Bureau. In sizing up the situation of the Boston fish



year Mr. Dimick, an undoubted authority in this matter, says: —

The production of ground fish has been large, but the year has been unsatisfactory to the producers as much of the time the fish sold at a price less than the cost of production. Mackerel, swordfish and halibut have been in good demand and they sold at good prices, and those branches of fishing have been fairly profitable. The receipts of fish from the outports as a rule were unsatisfactory.

It will be noted in the table for 1920 that distinction is made between large and smaller fish. These figures are cited to show how relatively small is the amount of small or immature fish landed by the vessels of the fish fleet.

#### *The Gloucester Fisheries.*

The fish receipts at Gloucester during 1920 reached a very low ebb, and it is safe to assert that not for a quarter century and probably even a longer period have the actual landings of fish at this port reached such a low level as the statistics for the past year reveal.

The receipts of fish at Gloucester from all sources show a total of 77,977,515 pounds as against 133,638,765 pounds for 1919. In other words, the 1920 receipts were but 58 per cent of the 1919 total, an amazing decline when considered in connection with the increased receipts of fresh fish at Boston, which port had its banner catch year.

The great decrease in receipts of fish by rail, mostly from the Canadian maritime province, and in the bringing in of fish not the product of the American fisheries by vessels from Canadian and Newfoundland ports (together aggregating nearly 27,000,000 pounds of salted and pickled fish), accounts for the major portion of the total drop, and also reflects the state of the salt-fish trade, which was severely affected by the collapse of the export business, due to the unusual situation in foreign exchange. For several years the exporting of cured fish has been one of the most prominent factors in the salt-fish business, and its decline materially affected the arrivals of fish here from Canadian and Newfoundland sources.

Receipts of haddock this year reached a normal level in comparison with the unusually large amount landed in 1919.

Pollock showed a large shortage on account of the light catch of the gill net fleet, the run of these fish in the fall and early winter being much smaller than usual. Because of the slump in the mackerel fishery after July 4, the receipts of salt mackerel were about half of those of 1919. The decline of the Newfoundland herring fishery as prosecuted by Massachusetts vessels is shown in the greatly reduced receipts of salt herring and the absence of arrival of crafts with frozen herring.

The following comparative table gives the receipts from all sources at this port for the past three years: —

	Dec. 1, 1919, to Nov. 30, 1920.	Dec. 1, 1918, to Nov. 30, 1919.	Jan. 1, 1918, to Nov. 30, 1918 (Eleven Months).
Salt cod, . . . . .	2,987,751	3,004,673	4,449,825
Fresh cod, . . . . .	25,835,345	28,087,983	27,977,652
Halibut, . . . . .	160,392	306,570	610,123
Haddock, . . . . .	8,473,534	16,127,331	8,568,578
Hake, . . . . .	1,480,557	779,840	581,222
Cusk, . . . . .	575,399	779,972	627,016
Pollock, . . . . .	5,117,982	18,524,658	16,154,131
Flitches, . . . . .	5,365	8,476	6,535
Not product of American fisheries, . . . . .	14,694,475	25,733,450	27,073,565
	59,330,800	93,352,953	86,048,647
Fresh mackerel, . . . . .	Pounds. 420,542	Pounds. 302,188	Pounds. 1,885,122
Salt mackerel, . . . . .	Barrels. 3,988	Barrels. 7,457½	Barrels. 12,000
Fresh herring, . . . . .	Pounds. 842,500	Pounds. 1,777,844	Pounds. 11,204,480
Salt herring, . . . . .	Barrels. 13,859	Barrels. 32,231	Barrels. 39,927
Frozen herring, . . . . .	—	—	Pounds. 187,205
Cured fish, . . . . .	Quintals. 9,803	Quintals. 12,265	Quintals. 20,037
Miscellaneous: —			
Small boats (estimated), . . . . .	Pounds. 2,000,000	Pounds. 5,000,000	Pounds. 7,000,000
By rail, . . . . .	7,888,949	23,410,979	22,870,000
Flounders, . . . . .	200,000	200,000	—
<i>Summary.</i>			Pounds.
Total, 1918 (to November 30), . . . . .			143,442,954
Total, Dec. 1, 1918, to Nov. 30, 1919, . . . . .			133,638,765
Total, Dec. 1, 1919, to Nov. 30, 1920, . . . . .			77,977,515

*The Lobster Fishery.*

The lobster fishing season opened very poorly, with a spring catch unusually small, and closed with a late fall catch all along the shore unusually gratifying both from its large proportions and from the great number of large lobsters taken, ranging from 2 to 5 pounds. The fall season also brought reports from the fishermen of more undersized lobsters seen than for a long term of years. Very high prices (the highest ever, according to the fishermen) were sustained throughout the season. Although it was feared the shortage of the catch during the spring and through the shedding term would result in a greatly decreased catch for the season, it turned out that the months of September, October and November produced results far above the average, and, indeed, exceptional in recent years, with the result that despite the poor start and threat of a most disastrous year, the total catch for the season actually exceeded that of 1919 both in number of catch and value at first hand. Statistics of the catch are published in the Appendix.

It is significant, too, that while the catch was larger, the value more, the number of men, boats and pots engaged somewhat larger than the previous year, showing that the industry was most intensively prosecuted, the fishermen report the greatest number of shorts thrown back in the water and also the largest number of lobsters of about 5 inches in length seen on the fishing spots for many years. These two latter conditions, in spite of markedly increased fishing the past ten years, while not enough to build an optimistic expression of opinion upon, yet do tend to show some slight improvement in the general lobster conditions along the Massachusetts coast.

Incidentally it is interesting to note that the Massachusetts catch of lobsters for 1920 is the largest, with one exception (1909), since the 9-inch legal length law went into effect in 1907, and also the largest, with the same exception (1909), of any year since 1891.

The most important legislation respecting the lobster fishery during the year was the restriction of the right to fish for lobsters to citizens of the State. Hitherto aliens, unwilling to



assume the obligations of citizenship, had reaped equal benefits with the citizens in making a livelihood in this industry.

As required by chapter 434, Acts of 1920, it is herewith reported that the number of lobster licenses issued in 1920 was 914.

The Division has continued its policy of distributing, in the waters of those districts where the lobstermen show a disposition to help themselves by observing the lobster laws, the short and seed lobsters seized from the shipments of live lobsters from Nova Scotia to Boston during the three months of open season in the southwestern section of that province. The number thus seized and distributed, in lots of from 700 to 1,000, numbered 12,650, as against 18,000 in 1919, 8,000 in 1918, and 37,000 in 1917. In addition to this a comparatively small number of egg-bearing lobsters, bought as usual from the Boston dealers, were liberated.

During the year, under supervision of one of the wardens, approximately 4,500 short lobsters, obtained from the fishermen in the locality, were deposited in Menemsha Pond on Marthas Vineyard to determine whether or not they will remain in the brackish pond and furnish a winter supply of lobsters.

About the middle of January the Director of the Division and the wholesale lobster dealers of Boston were apprised from unofficial sources of a bill, House, No. 4871, introduced in the national House of Representatives, to be heard on January 22 before the House committee of merchant marine and fisheries, which on its face appeared to threaten very seriously to affect the business of the Boston dealers in the importation of Nova Scotia lobsters and the shipment of the same over the country. The bill, which threatened to affect the whole lobster industry of all New England, New York and Nova Scotia, had for its object the closing of all ports of the United States to the landing of lobsters under 10½ inches caught outside the territorial waters of the United States. Great opposition to this measure sprung up on all sides. A resolution offered by Representative George F. Murphy of East Boston was adopted in the Legislature, opposing the measure. The objections from the Commonwealth were presented by Congressman Lufkin. As a result of this defensive action the bill was not reported out of committee.

*Alewives.*

*Fishery.* — The 1920 run was slightly better than the average. Certain streams, such as the Mattapoisett River, gave the first appreciably large yield in several years, while in previously good streams, as at Bournedale, the yield was considerably below normal. Taken as a whole, the production was fairly satisfactory, and with prevailing high prices afforded a fairly lucrative business. The prices received upon sale of fishing rights give an approximate idea of the annual value of streams in cases where the privileges are sold each year, but are deceiving where longer leases are in vogue. The 1920 sale prices for certain streams where fishing or seining rights were sold are given below. The fisheries of many streams were not sold.

Agawam River, . . . . .	\$11,000 00
Bass River, . . . . .	95 25
Herring River, Harwich, . . . . .	1,900 00
Mattapoisett River, . . . . .	105 00
Mill Pond Brook, Brewster, . . . . .	160 00
Taunton River, . . . . .	181 00
Town Brook, Plymouth, . . . . .	1,100 00

As an illustration of the ease with which a stream responds to ordinary care and business judgment, in 1917 the Mattapoisett River privilege, badly run down, was bought by Mr. George M. Besse of Wareham for \$105 per year. No fish were taken in 1917, 1918 and 1919, the entire run being permitted to reach the spawning grounds, with the result that from March 20 to May 19, 1920, 2,250 barrels were caught, and as many more allowed to pass to the spawning grounds.

*Industry.* — As usual the greater part of the catch was salted, many barrels going to the West Indies. On May 10, 1920, two carloads were shipped from Marthas Vineyard to Provincetown for cold storage. A smaller number were sold fresh and for local consumption. Prices ranged from \$6 to \$8 per barrel.

In the spring of 1919 it became known that at some of the Cape Cod alewife fisheries men were engaged in stripping the bright scales from the underbodies of the alewives and

selling them to a party in Hyannis at the reported price of from 50 cents to \$1 per pound, and even more. Though for a long time the eventual market and the use made of the scales was kept secret, it is now known that they are used in the manufacture of artificial pearls. The high value of the product is evidenced by the great increase in the sale price of the Agawam River fishing privilege, from \$1,255 in 1919 to \$11,000 in 1920, and to the fact that a 125-pound keg of scales was insured, when shipped by express, for \$900. The new business has continued through 1919 and 1920. Thus the alewives bring a double revenue, — from the sale of the scales and from the sale of the stripped fish for food and bait. This new business provides an additional argument for the reconstruction and development of the depleted alewife streams, a project which has been repeatedly recommended by this Division.

*Investigations.* — A report upon the alewife fishery has been published, making specific recommendations for the restoration of the fishery. The investigations during 1920 have been confined to (1) examination of obstructions on certain streams, (2) inspection of fishways, (3) observations on the spawning habits and artificial hatching, and (4) experiments in transplanting.

(1) *Obstructions.* — Herring River, Wellfleet, and Childs River, Falmouth, were examined for obstructions. The impassable sluice on Herring River was removed by the local authorities on recommendation of this Division. The fishway on Childs River, at Waquoit village, was found closed, but an agreement was made by which alewives will be given an unobstructed passage up the main stream, thereby eliminating the necessity of using this fishway.

(2) *Fishways.* — An inspection of all the fishways on every important alewife stream was made in May by a representative of this Division, to ascertain their condition.

(3) *Artificial Hatching.* — Observations were made upon the fish in the streams, and on the spawning beds, as regards the ratio of males to females, and the per cent of ripe males and females present in schools at various dates. The artificial hatching proved a failure, owing to inability to obtain a sufficient quantity of mature females. The eggs while the



fish are passing up stream are for the most part green, and do not ripen until the spawning grounds are reached. It has not been found possible to hold alewives in small enclosures until their eggs reach the proper stage for stripping.

(4) *Transplanting*. — Various experiments were made with the idea of ascertaining the most satisfactory method of transplanting mature alewives, special attention being given to their reaction to the factors of distance, time, aëration, temperature and number per can. In May, 1,230 alewives were carried from the Bournedale stream to Long Pond, Plymouth, in order that their offspring might provide a source of food for the Chinook salmon present therein, the supply of landlocked smelt which had provided their food in previous years having become exhausted. Difficulty was experienced in transporting the alewives, as they are extremely susceptible to injury through handling.

*Death of Herring at Cohasset*. — An unfortunate occurrence took place at Cohasset in October, when 50,000 barrels of young herring, with smaller numbers of other species, were stranded on the shore and perished. So great was the destruction that the shores and flats of the vicinity were white with dead fish and a public nuisance was caused by their disintegration. The first loss occurred on October 3, when a large school of 4 to 5 inch sea herring became stranded on the evening tide, thickly covering the entire head of the harbor, especially the coves, where they were piled several layers deep. Estimates placed the destruction at 20,000 barrels. They soon decayed, causing in the upper end of the harbor, where there was little circulation, a body of badly polluted water in which it was impossible for fish to survive.

A second but smaller run occurred October 10, and was followed by small runs of fish, so that the process became almost continuous, the newcomers dying in the polluted water at the head of the harbor. A second large run occurred on October 15, causing conditions resembling the first, with approximately the same loss. About 10 per cent of the first and 5 per cent of the second large run were adult sea herring. A few tinker mackerel and whiting and a large number of smelt were also destroyed.

At this time of year large schools of small herring are found off the coast, and doubtless the first catastrophe was due to one of these being driven well into the bay by reason of being rushed by larger fish. The frenzied rush of the smaller species in attempting to escape their pursuers, caught as they were in a blind pocket, together with a high course tide, resulted in their becoming stranded between the tide lines. Their decomposition brought about the foul condition of water which proved a death trap for the subsequent arrivals, resulting in an almost continuous process. As going to prove this, it was impossible to keep lobsters alive in cars in this water; the dead fish showed no evidence of disease, and fish from the same schools which entered the mouth of Gulf River survived. No satisfactory remedy could be found. It proved impossible to break the chain of events without the expenditure of large sums to clear the harbor of dead fish, and no practical means could be devised for preventing new schools from entering the harbor. An attempt by the fire department to clear the flats by use of a hose was abandoned; the amounts carted away for fertilization made little impression on the quantity; raking or gathering by hand proved inexpedient on account of the cost and the scarcity of labor, and the stranded fish had to be left for disposal by nature's slow but sure methods.

### *Shad.*

The plans laid between Connecticut, California and Massachusetts for the re-establishment of the shad in eastern waters appear impossible of accomplishment without the expenditure of substantial sums of money. Owing to war conditions and shortage of labor no collection of shad eggs were made in California (the only source of eggs) in 1918 and 1919, and the officials of that State now consider that such collections will require a movable equipment and hatchery, the cost of which would be several thousand dollars. This being the case, Massachusetts would be unable to engage in such a venture without an appropriation for the purpose from the Legislature.

*The Mollusk Fisheries.*

The past year has witnessed little change in the general shellfish situation, for, with a few exceptions, the same old methods have obtained, and the usual returns have resulted. For many years the Division of Fisheries and Game has looked forward hopefully to the commercial adoption of shellfish farming, the success of which was demonstrated previous to 1910 by extensive experimental study. It is disappointing to realize that so little progress has been made in the utilization of the non-productive tidal waters. Encouragement to prospective shellfish farmers in the form of progressive protective legislation seems to be the principal condition precedent at the present time. In any event, it may safely be said that the future success of the shellfish industries depends upon the extensive development of commercial shellfish farming.

*Clams.* — The production of clams, particularly in the Ipswich Bay section of the coast, has been above the average. Clam farming has been continued in Barnstable and Plymouth. The sale of clams to automobilists along the roadway, in the same manner as vegetables are sold in other parts of the State, has attracted considerable notice in Essex County.

*Scallops.* — The 1919-20 fishery returns proved excellent, but the scarcity of seed scallops was early noticed, and the 1920-21 season (up to Nov. 30, 1920) proved almost a complete failure. Scallops brought the high price of \$8 to \$9 a gallon, but were very scarce. A bed of sea scallops was discovered off the western end of Marthas Vineyard, which gave good returns.

The winter of 1919-20 was a severe one, and early ice prevented fishing before the supply of scallops in Buzzards Bay was at all exhausted. The 10-bushel limit had so restricted the catch in the early part of the season that a large quantity of scallops remained when the harbors were closed with ice, which did not leave until the end of the open season. The scallops thus made inaccessible would have died naturally before another open season, resulting in an extensive economic waste, unless their taking out of season were legalized. This situation was met by the enactment of chapter 139, Acts of 1920, which empowered the commissioner of conservation in his discretion



to authorize city and town authorities to issue permits to inhabitants of their cities or towns for taking scallops at prescribed times and in prescribed quantities when, owing to unusual circumstances, the scallops that are or will be available could not otherwise be taken without violation of the law. On request, the Department authorized the selectmen of Marion, Wareham, Nantucket and Bourne to issue permits for the taking of scallops in unlimited quantities (except that Wareham was limited to 15 bushels per person per day), total catch to contain not more than 5 per cent of seed scallops, up to May 1, 1920 (in the case of Wareham up to April 15, 1920). A novel method of catching scallops was employed at Wareham. Prevented by ice from using boats the fishermen cut parallel slits in the ice about 150 feet apart over the scallop beds, passed a rope under the ice between them by means of poles, and by attaching two ropes to a dredge hauled the dredge back and forth, either by hand or by horse, over the area between the two openings in the ice. The high price of scallops made this method, laborious as it proved to be, a paying proposition, and introduced a most unique method of scalloping, — another tribute to Yankee ingenuity.

*Oysters.* — The oyster industry has fallen off from the yield in previous years, thus sharing in the general stagnation of this important industry along practically all of the north Atlantic coast.

*Quahaugs.* — The quahaug fishery has given an average yield, and there have taken place no particularly noteworthy happenings with regard to it.

*Pollution of Shellfish Grounds.* — Under the provisions of section 113 of chapter 91 of the Revised Laws the Department of Public Health on March 9, 1920, requested the Department of Conservation to prohibit the taking of oysters, clams or quahaugs from the waters or flats of Boston Harbor, including the tributaries of the Charles, Mystic and Neponset rivers, the Chelsea River, and Dorchester and Quincy bays, inside, or west, of a line drawn from Windmill Point in Hull to the southeasterly point of Deer Island and through Deer Island and across Shirley Gut to Point Shirley, excepting along the Winthrop shore inside, or northeast, of a line drawn from the outer end of the steamboat landing of the Point Shirley Club at Point Shirley to the outer end of the Cottage Park

Club Wharf on the southerly shore of Winthrop between Orlando and Woodside avenues; and also about the shores of Lovells, Gallups and Georges islands. At a meeting of the Department of Conservation on March 26, 1920, the requested prohibition was made for three years from April 10, 1920, and fully advertised through the press in all towns bordering the area affected.

The bounds as set forth having proved insufficiently definite for proper enforcement of the regulations, they were revised, and on Oct. 19, 1920, the Department of Public Health requested the closing, to the taking of oysters, clams, quahaugs or scallops, of the waters or flats of Boston Harbor, including all its arms and tributaries, inside of a line drawn from Windmill Point in Hull to the southeasterly point of Deer Island and through Deer Island and across Shirley Gut to Point Shirley, excepting along the Winthrop shore inside, or north-east, of a line drawn from the outer end of the steamboat landing of the Point Shirley Club at Point Shirley to the outer end of the Cottage Park Yacht Club Wharf on the southerly shore of Winthrop between Orlando and Woodside avenues, and excepting along the westerly shore of Hull east of a line drawn from the westerly extremity of Sunset or Nantasket Point to the Windermere Station on the New York, New Haven & Hartford Railroad; also about the shores of Lovells, Gallups and Georges islands. The above-specified area was closed, at a meeting of the Department of Conservation, on Nov. 10, 1920, for three years from Nov. 20, 1920, and duly advertised.

Under the same act request was made for the prohibition of the taking of clams, oysters or quahaugs from the waters or flats of Cohasset Harbor including its tributaries, inside or west of the stone breakwater and a line drawn in extension thereof to high-water mark on the northerly side of the harbor. The desired prohibition was made at a meeting of the Department of Conservation on Oct. 27, 1920, for three years from Nov. 8, 1920, and duly advertised.

Respectfully submitted,

WILLIAM C. ADAMS,

*Director, Division of Fisheries and Game.*





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# APPENDIX

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## APPENDIX.

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### RECOMMENDATIONS FOR LEGISLATION.

I. *To amend the Law relative to issuing Hunting and Fishing Licenses.* — The present law requires licenses for fishing in only those inland waters which have been stocked by this Department since Jan. 1, 1910. The publication yearly of lists of waters stocked during the year involves considerable expense. Further, by reason of the fact that many streams are known by various names, much confusion is created in the minds of persons who wish to determine whether a stream has or has not been stocked. Many of the unstocked inland waters are being depleted, and we believe they should be protected by requiring licenses for fishing therein.

A person wishing to secure a duplicate of a lost or destroyed license is required by the present law to apply, either in person or by letter, at the office of the Division of Fisheries and Game. This is an inconvenience to the public, and creates a volume of work in the office of the division at the busiest season of the year. An amendment permitting the issuance of duplicates by city and town clerks will remedy this, and the 25-cent fee will have the effect of reducing the number of licenses lost.

Under the existing law there is no limit to the amount of fish or game which a non-resident may take out of the State under his license, except in the case of birds and brook trout. Inasmuch as the Department is bending every effort to conserve the supply of wild life within the Commonwealth, it seems only just and fair that a limit be set.

II. *To provide a Penalty for destroying or injuring Private Property while Hunting, Trapping or Fishing.* — Instances have occurred where thoughtless hunters and fishermen have destroyed or injured private property while pursuing their sport. In order to safeguard the rights of landowners; to secure for the Fish and Game Division their hearty co-operation in the



conservation of wild life rather than their condemnation of all things relating to hunting and fishing; and to spare the true sportsman the injustice of being obliged to share the blame for the deeds of the unmindful, we believe that the accompanying bill is timely and necessary.

III. *To empower Fish and Game Wardens to arrest Persons who assault them or interfere with them in the Performance of their Duties.* — At the present time the fish and game wardens have no authority to forthwith arrest persons who would assault them or interfere with them in the performance of their duties. Much of their work being done at night, when recognition of such persons is impossible, without the power of arrest on the spot there is no redress for the wardens. A case in point occurred a short time ago when two wardens were attacked and forced to take to cover to protect themselves from injury, since they had no right to charge the crowd and arrest the offenders.

IV. *To provide for Payment for Damage caused by Moose.* — Many times the moose which are at large in the Commonwealth have caused damage to private property. We deem it fair and just that compensation for such damage should be paid as in the case of damage done by deer.

V. *To regulate the Release within the Commonwealth of Wild Birds or Animals.* — Cases have come to our attention of the liberation, by breeders, of game birds or animals, or sick or diseased stock. To safeguard the health of the stock in the wild, we deem it necessary to reserve the right to judge what birds or animals may be liberated. The liberation of fish in waters of the Commonwealth is already, by law, placed under the control of the Department.

VI. *To correct the Law relating to Fur-bearing Animals.* — Because of the omission of the month of March from the open season on muskrats, and because the section relating to the training of dogs is not plain to the layman, amendment of the law is necessary as set forth in the accompanying act.

VII. *To permit the Importation into Massachusetts of Fish and Game taken legally outside the Commonwealth, and to permit Possession of Such Fish and Game after the Close of the Season.* — The present laws permit the taking of a bag limit of fish and

game on the last day of the open seasons; but the person taking it cannot reasonably be expected to dispose of the same immediately. The accompanying act will give a reasonable length of time for the disposal of game and fish legally taken during the open season. It will also permit the importation and possession, after the close of seasons in Massachusetts, of fish and game taken legally outside of the Commonwealth.

VIII. *To permit the Importation of European or Gray Partridge.* — In order to encourage the local breeding of European or gray partridge, this species was not mentioned in section 5 of chapter 567, Acts of 1912, among the species which might be imported from without the United States. But as no disposition has been shown by local breeders to propagate them, it appears advisable to meet the demand for these birds by authorizing their importation. For this reason we recommend that this species be included in the birds named in section 5 of said act.

IX. *To permit the Killing or Trapping of Predatory Birds or Animals within Reservations.* — The authority for the issuance of permits to destroy harmful birds or animals on reservations is limited, by section 4, chapter 410, Acts of 1911, to issuance to wardens or owners or occupants of land within the reservations. For the better protection of useful wild life it is desirable that the Department's authority be extended to the issuance of permits to any responsible person who may be willing to assist in the destruction of undesirable species.

X. *To amend the Law pertaining to Wild or Undomesticated Birds.* — Section 7, chapter 92, of the Revised Laws was enacted before ducks, geese and waterfowl were protected by law. It is now necessary to omit these species from the law in order to avoid conflict with subsequent laws.

XI. *To make the Laws of Massachusetts relative to Migratory Birds conform with the Laws of the United States.* — The Federal government has entered into a treaty with Great Britain for the uniform protection of migratory birds on the American continent. The Federal laws in this connection render conflicting State laws void. For the convenience of the public, and for the proper enforcement of the law, it is desirable to

have the laws of this Commonwealth conform with the Federal rules and regulations.

XII. *To regulate the Catching and Sale of Fresh-water Fish.* — Winter fishing and absence of restriction on the sale of pond fish have been two of the principal causes of the depletion of inland fisheries during the past few years. Progressive conservation demands that catch and sale limits be established.

XIII. *To permit the Taking of Eels in the Vicinity of Hingham Harbor.* — Inasmuch as eels have done much damage to the smelt fisheries in this vicinity, which are the principal remaining smelt fisheries of the State, the taking of eels in this locality should be permitted, notwithstanding the provisions of chapter 27, General Acts of 1916.

XIV. *To regulate the Taking of Lobsters.* — The laws of Rhode Island, Connecticut and New York provide for the measurement of lobsters according to the so-called body measure. The State of Maine this year proposes to amend its law so as to adopt the same method, with a view to furthering the movement for a uniform measure for New England and New York. Uniform method of measurement will increase the chance for co-operation among the adjacent States. The size of legal lobsters will remain practically the same, and the chance for confusion will be eliminated.

XV. *Relative to taking Fresh-water Fish.* — The increased number of fishermen, the accessibility of waters by reason of the automobile, the great expense of artificial propagation on a scale sufficient to meet the requirements, make it imperative that the taking of fresh-water fish from our inland waters should be limited to a reasonable number per day.



## STATISTICS.

*Returns from the Shore Net and Pound Fisheries for the Year 1920.*

["L" indicates that the person engaged also in lobster fishing, and the figures are given in the table entitled "Returns from the Lobster Fisheries, 1920."]

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pounds.	Value.	Number of Nets.	Value.
Cape Cod Fish Freezing and Packing Company, Barnstable Trap Company, . . . . .	Barnstable, Barnstable, . . . . .	10 7	5 } 4 }	\$4,900 00	6	\$12,000 00	-	-
James E. Eldredge, . . . . .	Brewster, . . . . .	1	1 }	175 00	5	3,100 00	2	\$75 00
Gilbert E. Ellis, . . . . .	Brewster, . . . . .	7	3 }					
Arthur S. Hall, . . . . .	Brewster, . . . . .	1	- }					
T. W. Holway, . . . . .	Chatham, . . . . .	L	L }	L	L	L	42	1,100 00
Seymour Patterson, . . . . .	Chatham, . . . . .	L	L }					
George W. Bloomer and George W. Bloomer, Jr., . . . . .	Chatham, . . . . .	L	L }					
C. C. Flanders & Co., . . . . .	Chilmark, . . . . .	2	4 }	1,045 00	4	512 00	-	-
Daniel W. West, . . . . .	Chilmark, . . . . .	3	5 }					
T. and J. Busalacchi, . . . . .	Dennis, . . . . .	5	2 }					
George E. Hall, . . . . .	Dennis, . . . . .	L	L }	60 00	1	300 00	L	L
Henry Hall, . . . . .	Dennis, . . . . .	L	L }					
Benjamin Walker, . . . . .	Dennis, . . . . .	L	L }					
Domingo Brown, . . . . .	Fairhaven, . . . . .	L	L }					
John Brown, . . . . .	Fairhaven, . . . . .	1	1 }					
Charles E. Cowan, . . . . .	Fairhaven, . . . . .	4	3 }	770 00	4	1,800 00	-	-
Frederick Pease, . . . . .	Fairhaven, . . . . .	2	4 }					
H. Nelson Wilbur, . . . . .	Fairhaven, . . . . .	1	5 }					

## Returns from the Shore Net and Pound Fisheries for the Year 1920 — Concluded.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pounds.	Value.	Number of Nets.	Value.
T. M. Douthart, . . . . .	Falmouth, . . . . .	3	3 }	\$1,375 00	1	\$1,500 00	-	-
Daniel C. Jennings, . . . . .	Falmouth, . . . . .	3	3 }					
L. L. Vanderhoop, . . . . .	Gay Head, . . . . .	5	2	50 00	1	700 00	-	-
Alfred Anderson, . . . . .	Gloucester, . . . . .	2	5 }					
Frank C. Hodgekins, . . . . .	Gloucester, . . . . .	2	2 }	2,220 00	-	-	2	\$160 00
Henry W. Nelson, . . . . .	Gloucester, . . . . .	2	2 }					
Charles F. Tarr, . . . . .	Gloucester, . . . . .	1	- }					
George M. Gray, . . . . .	Gosnold, . . . . .	9	5 }	3,320 00	2	3,200 00	-	-
Marine Biological Laboratory, . . . . .	Gosnold, . . . . .	9	6 }					
Edward W. Heath, . . . . .	Manchester, . . . . .	2	5	1,000 00	-	-	-	-
John M. Taylor, . . . . .	Nahant, . . . . .	L	L	L	L	L	L	L
Arthur J. Barrett, . . . . .	Nantucket, . . . . .	10	12	4,600 00	3	3,000 00	106	1,900 00
C. A. Caswell & Co., . . . . .	Newburyport, . . . . .	2	2	75 00	-	-	2	200 00
A. L. Daggett, . . . . .	Provincetown, . . . . .	7	5 }					
Manuel James, . . . . .	Provincetown, . . . . .	2	3 }					
John Johnson, . . . . .	Provincetown, . . . . .	3	3 }					
Levi A. Kelley, . . . . .	Provincetown, . . . . .	1	1 }	11,605 00	2	1,000 00	291	7,300 00
Wm. B. Lewis, . . . . .	Provincetown, . . . . .	5	6 }					
Alfred A. Mayo, . . . . .	Provincetown, . . . . .	1	1 }					
Frank I. Sears, . . . . .	Provincetown, . . . . .	3	2 }					
A. W. Goff, . . . . .	Raynham, . . . . .	8	1	25 00	-	-	2	200 00
Charles A. Colson, . . . . .	Rockport, . . . . .	L	L }	L	L	L	L	L
Carl E. Nelson, . . . . .	Rockport, . . . . .	L	L }					
C. G. Bigwood, . . . . .	Salem, . . . . .	L	L }	950 00	-	-	20	200 00
George W. Dunn, . . . . .	Salem, . . . . .	2	2 }					





*Number of Pounds of Fish taken*

TOWN.	Alewives.	Bluefish.	Flounders.	Mackerel.	Menhaden.	Pollock.	Cod.	Scup.
Barnstable, . . . .	-	-	130	66,035	1,900	-	11,005	-
Beverly, . . . .	-	-	-	-	-	-	-	-
Boston, . . . .	-	-	-	-	-	-	-	-
Bourne, . . . .	-	-	-	-	-	-	-	-
Brewster, . . . .	49,180	9	555	4,208	6,650	-	800	-
Chatham, . . . .	-	-	5,213	10,664	1,216	-	-	-
Chilmark, . . . .	-	8	1,050	6,682	-	-	50	500
Cohasset, . . . .	-	-	-	-	-	-	-	-
Dennis, . . . .	-	400	-	3,125	-	-	300	-
Fairhaven, . . . .	19,568	11,126	5,158	3,672	38,665	-	-	18
Fall River, . . . .	-	-	-	-	-	-	-	-
Falmouth, . . . .	35,885	322	32	1,348	1,905	-	-	75
Gay Head, . . . .	-	-	-	-	-	-	-	800
Gloucester, . . . .	3,000	-	17,928	18,093	-	10,000	1,666	-
Gosnold, . . . .	1,235	68	1,950	6,616	3,300	1	22	1,048
Hull, . . . .	-	-	-	-	-	-	-	-
Manchester, . . . .	7,629	-	-	9,627	-	6,254	3,677	-
Marblehead, . . . .	-	-	-	-	-	-	-	-
Marshfield, . . . .	-	-	-	-	-	-	-	-
Nahant, . . . .	500	-	-	-	-	-	-	-
Nantucket, . . . .	72,000	-	4,150	30,475	-	-	-	2,200
New Bedford, . . . .	-	-	-	-	-	-	-	-
Newburyport, . . . .	-	-	-	-	-	-	-	-
Orleans, . . . .	-	-	-	-	-	-	-	-
Plymouth, . . . .	-	-	-	-	-	-	-	-
Provincetown, . . . .	-	-	410,900	60,674	10,400	-	1,025	-
Quincy, . . . .	-	-	-	-	-	-	-	-
Raynham, . . . .	100,000	-	-	-	-	-	-	-
Revere, . . . .	-	-	-	-	-	-	-	-
Rockport, . . . .	-	-	-	-	-	-	10,000	-
Salem, . . . .	-	-	-	-	-	-	40,888	-
Salisbury, . . . .	-	-	-	-	-	-	-	-
Sandwich, . . . .	-	-	-	1,557	-	-	280	-
Scituate, . . . .	-	-	-	-	-	-	-	-

*in Pounds, Nets, Traps, etc., 1920.*

Sea Herring.	Shad.	Squeteague.	Hake.	Squid.	Tautog.	Other Edible or Bait Spe- cies.	Lobsters.	Total Pounds.	Total Value.
41,800	-	-	-	194,500	760	320,105	4,176	640,411	\$19,825 94
-	-	-	-	-	-	-	36,105	36,105	10,080 10
-	-	-	-	-	-	-	7,125	7,125	1,727 38
-	-	-	-	-	-	-	40,788	40,788	10,186 93
96,895	-	-	-	8,075	117	16,662	-	183,151	3,642 54
-	-	-	-	-	-	-	22,664	39,757	9,881 11
-	10	-	-	-	-	12,980	187,144	208,424	39,745 60
-	-	-	-	-	-	-	37,220	37,220	8,693 39
-	-	-	-	-	-	-	9,743	13,568	3,169 97
72,434	38	217	12	30,513	15,745	25,580	41,264	264,010	13,594 01
-	-	-	-	-	-	-	-	-	-
-	7	-	-	10,446	9,028	73	46,188	105,309	10,444 64
-	-	-	-	-	-	4,200	69,510	74,510	12,822 19
-	-	-	-	-	-	40,300	108,023	199,010	29,270 16
1,135	5	43	143	8,400	130	26,573	168,164	248,833	36,436 93
-	-	-	-	-	-	-	22,451	22,451	6,288 76
11,348	967	-	-	170	-	160,825	17,852	218,346	7,605 31
-	-	-	-	-	-	-	97,973	97,973	26,182 83
-	-	-	-	-	-	-	69,448	69,448	16,663 92
3,000	-	-	-	-	-	600	43,511	47,611	3,422 53
4,000	16,650	-	-	30,050	-	30,750	9,452	199,727	16,796 91
-	-	-	-	-	-	-	225,411	225,411	46,148 95
-	-	-	-	-	-	20,862	3,428	24,290	1,520 68
-	-	-	-	-	-	-	2,475	2,475	1,237 50
-	-	-	-	-	-	-	146,796	146,796	30,492 45
41,800	-	-	-	128,200	-	96,745	101	749,845	26,958 36
-	-	-	-	-	-	-	1,577	1,577	814 40
-	1,100	-	-	-	-	-	87,365	188,465	22,226 23
-	-	-	-	-	-	-	2,191	2,191	1,997 89
300	-	-	-	-	-	-	-	10,300	401 00
-	-	-	-	-	43	-	14,982	55,913	5,345 89
-	-	-	-	-	-	-	4,560	4,560	1,386 00
-	-	-	-	9,295	-	3,800	8,933	23,865	3,152 13
-	-	-	-	-	-	-	152,595	152,595	31,719 42

*Number of Pounds of Fish taken in*

TOWN.	Alewives.	Bluefish.	Flounders.	Mackerel.	Menhaden.	Pollock.	Cod.	Scup.
Swampscott, . . .	-	-	-	-	-	-	-	-
Tisbury, . . .	6,931	500	14,474	49,916	15,745	365	1,230	12,440
Westport, . . .	8,000	-	-	-	-	-	-	-
Weymouth, . . .	-	-	-	-	-	-	-	-
Yarmouth, . . .	-	-	38,705	17,165	-	-	9,565	-
Totals, . . .	303,928	12,433	500,245	289,857	79,781	16,620	80,508	17,081



*Pounds, Nets, Traps, etc., 1920 — Concluded.*

Sea Herring.	Shad.	Squeteague.	Hake.	Squid.	Tautog.	Other Edible or Bait Species.	Lobsters.	Total Pounds.	Total Value.
-	-	-	-	-	-	-	41,118	41,118	\$10,803 84
-	25	525	-	35,988	262	30,655	21,723	190,779	16,543 60
-	-	-	-	-	-	-	84,953	92,953	15,891 43
-	-	-	-	-	-	-	20,598	20,598	7,147 96
-	-	-	-	-	-	200	5,762	71,397	8,807 65
272,712	18,802	785	155	455,637	26,085	790,910	1,893,369	4,758,908	\$519,076 53

*Returns from Lobster Fisheries, 1920.*

"S" indicates that the proprietor was also engaged in shore fisheries to a greater extent than lobster fishery. Information will be found in the table entitled "Returns from the Shore Net and Pound Fisheries for the Year 1920."

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Edgar Bourse, Jr.,	Barnstable.	1	1	\$1,280 05	57	\$118 00	2,784	\$1,798 69	9
Clarence Chase,	Barnstable.	1	3						
Nelson Marchant,	Barnstable.	2	3						
George W. Sturges,	Barnstable.	1	2						
David Bouchard,	Beverly.	1	1						
Emile Bouchard,	Beverly.	2	2						
John A. Bray,	Beverly.	1	1						
Luther A. Caloon,	Beverly.	1	1						
Arthur Daigle,	Beverly.	4	1						
Charles A. Davis,	Beverly.	1	1						
Harry C. Hannable,	Beverly.	1	1	889 25	648	1,499 00	24,070	10,080 10	336
Oliver Horey,	Beverly.	1	1						
Warland Horey,	Beverly.	1	1						
Joseph Julius,	Beverly.	1	1						
John Shaper,	Beverly.	1	2						
Nelson Southwick,	Beverly.	1	1						
W. E. Weeks,	Beverly.	1	1						
Antonio Vieira,	Boston,	1	1	600 00	400	1,200 00	4,750	1,727 38	276
Charles Benson,	Bourne,	1	1						
Jos. M. Butts,	Bourne,	1	1						
Joseph Casson,	Bourne,	1	1						
Arthur H. Gibbs,	Bourne,	1	3						
Albert A. Nightingale,	Bourne,	1	2						
Alvin E. Nightingale,	Bourne,	1	1						
W. J. Nightingale,	Bourne,	2	1						
E. B. Robinson,	Bourne,	1	2	3,425 00	627	1,978 00	27,192	10,186 93	512
Herbert A. Ryder,	Bourne,	1	2						
Swift & Gibbs,	Bourne,	2	2						

Bonj. R. Baker,	Chatham,	1							
Joseph D. Bloomer,	Chatham,	2							
Wm. Eugene Eldredge, Jr.,	Chatham,	3							
Walter W. Eldredge,	Chatham,	1							
Charles G. Hamilton,	Chatham,	1							
T. W. Holway,	Chatham,	1							
Ralph W. Hunter,	Chatham,	2							
Joseph A. Nickerson,	Chatham,	1							
Seymour Patterson,	Chatham,	2							
R. A. Tripp,	Chatham,	1							
George W. Bloomer and George W. Bloomer, Jr.,	Chatham,	2							
Willard H. Nickerson,	Chatham,	1							
David T. Butler,	Chilmark,	1							
Frank Correa,	Chilmark,	2							
Roy E. Cottle,	Chilmark,	1							
Ingal J. Dalen,	Chilmark,	2							
Ernest J. Deane,	Chilmark,	2							
George D. Eustis,	Chilmark,	1							
Oscar B. Flanders,	Chilmark,	1							
Capt. Stephen I. Gardiner,	Chilmark,	2							
Benj. H. Hisson,	Chilmark,	1							
James H. Hunt,	Chilmark,	1							
Rasmus Klimm,	Chilmark,	1							
Jerry Look,	Chilmark,	1							
Paul F. Maciel and George D. Eustis,	Chilmark,	1							
Benjamin C. Mayhew,	Chilmark,	1							
E. C. Mayhew,	Chilmark,	4							
James A. Mayhew,	Chilmark,	1							
Wm. S. Mayhew,	Chilmark,	1							
Clarence Morgan,	Chilmark,	2							
Ernest A. Poole,	Chilmark,	2							
Albert E. Reed,	Chilmark,	1							
Harry G. Reed,	Chilmark,	1							
Franklin P. Tilton,	Chilmark,	1							
Joseph Tilton,	Chilmark,	1							
Percy G. Tilton,	Chilmark,	1							
Ralph F. Tilton,	Chilmark,	1							
Daniel Vincent,	Chilmark,	1							
Carl J. Vigfors,	Chilmark,	2							

## Returns from Lobster Fisheries, 1920 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
George T. Ainslee,	Cohasset,	1	1						
Charles A. Brigham,	Cohasset,	1	2						
Levi Cadose,	Cohasset,	1	2						
Wm. S. Douglas,	Cohasset,	1	3						
John Eltman,	Cohasset,	1	2						
Antone S. Figueiredo,	Cohasset,	3	2	\$3,175 00	885	\$3,190 00	24,813	\$8,693 39	269
Henry B. Kimball,	Cohasset,	1	1						
Frank Lean,	Cohasset,	1	1						
C. Henry Nolan,	Cohasset,	1	1						
Andrew Peterson,	Cohasset,	1	1						
Alton J. Priest,	Cohasset,	1	1						
Oscar F. Gibbs,	Dennis,	1	1						
George E. Hall,	Dennis,	1	1						
Henry Hall,	Dennis,	1	4	480 00	288	567 00	6,495	2,575 47	204
Isaac W. Tucker,	Dennis,	1	2						
Benjamin Walker,	Dennis,	1	2						
Candy Brown,	Fairhaven,	1	2						
Domingo Brown,	Fairhaven,	3	3						
Joe Brown,	Fairhaven,	1	2						
Chas. W. Cook,	Fairhaven,	1	2						
Frank Corey,	Fairhaven,	1	1						
Antone R. Everett,	Fairhaven,	1	1	2,255 00	776	1,852 00	27,509	7,619 91	468
Peter Fontaine,	Fairhaven,	1	2						
Capt. Miguel Gonsalves,	Fairhaven,	1	1						
Gaspard Souza,	Fairhaven,	1	2						
George D. Taber,	Fairhaven,	1	2						
James F. Cook,	Falmouth,	1	2						
C. W. Fisher,	Falmouth,	1	1						
F. E. Garland,	Falmouth,	1	1						
Charles R. Grinnell,	Falmouth,	1	3						
Alfred M. Hilton,	Falmouth,	1	1						
Oscar R. Hilton,	Falmouth,	1	1						
Joseph Joseph,	Falmouth,	1	1						
Francis Minot,	Falmouth,	2	2						
B. K. Nickerson,	Falmouth,	1	1	5,790 00	575	1,322 50	30,792	8,806 39	267



Walter E. Nickerson,	Falmouth,	1	3,271 00	727	2,256 27	46,340	12,638 19	730
Henry A. Plimney,	Falmouth,	1						
Frank Rotnick,	Falmouth,	1						
Milburn C. Stuart,	Falmouth,	2						
Prince M. Stuart,	Falmouth,	1						
A. C. Swain, Jr.,	Falmouth,	1						
Henry E. Wright,	Falmouth,	1						
Arthur S. Weeks,	Falmouth,	1						
Benj. J. Allaquin,	Gay Head,	2						
Daniel W. Belain,	Gay Head,	2						
Moses P. Cooper,	Gay Head,	2						
Nathan A. Francis,	Gay Head,	2						
Linus F. Jeffers,	Gay Head,	2						
Joseph H. Lang,	Gay Head,	2						
Walter W. Manning,	Gay Head,	2						
Augustus Reinertson,	Gay Head,	1						
Onslow S. Robinson,	Gay Head,	1						
Charles H. Ryan,	Gay Head,	1						
Grover O. Ryan,	Gay Head,	1						
Alonzo V. Smally,	Gay Head,	1						
Harrison L. Vanderhoop,	Gay Head,	1						
Edward L. Ashley,	Gloucester,	1						
Henry Ashley,	Gloucester,	1						
F. W. Babson,	Gloucester,	1						
Frank Balcombe,	Gloucester,	2						
Eugene Barusso,	Gloucester,	1						
Frank B. Brewer,	Gloucester,	1						
John Brindle, Jr.,	Gloucester,	2						
Daniel S. Burnham,	Gloucester,	1						
Frank F. Butler,	Gloucester,	1						
William Enos,	Gloucester,	1						
Wm. F. Enos, Jr.,	Gloucester,	1						
Antone Fenant,	Gloucester,	1						
Joseph A. Goodwin,	Gloucester,	1						
George L. Jacobs,	Gloucester,	1						
James E. Jacobs,	Gloucester,	1						
John B. Knowlton,	Gloucester,	1						
Peter Knutson,	Gloucester,	2						
Herman L. Marchant,	Gloucester,	1						
Walter E. Marchant,	Gloucester,	1						
Davie E. Mehlman, Jr.,	Gloucester,	1						
Joseph Moniz,	Gloucester,	1						
E. M. Nelson,	Gloucester,	1						
Fred Parsons,	Gloucester,	1						
			4,021 50	2,576	6,757 00	72,015	25,164 27	558

## Returns from Lobster Fisheries, 1920 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Ira Parsons, . . . . .	Gloucester, .	1	1						
John H. Perry, . . . . .	Gloucester, .	1	1						
Alfred W. Ruley, . . . . .	Gloucester, .	1	1						
James E. Robinson, . . . . .	Gloucester, .	1	1						
B. Franklin Saunders, . . . . .	Gloucester, .	1	1						
Everett L. Small, . . . . .	Gloucester, .	1	1						
Arthur Stevens, . . . . .	Gloucester, .	1	1						
Fred Swanson, . . . . .	Gloucester, .	1	1						
Manuel Vitor, . . . . .	Gloucester, .	1	1						
Manuel Vitor, Jr., . . . . .	Gloucester, .	1	1						
Walter White, . . . . .	Gloucester, .	1	1						
Charles Wilson, . . . . .	Gloucester, .	1	1						
Wm. H. Wyman, . . . . .	Gloucester, .	1	1						
David P. Fogelgren, . . . . .	Gloucester, .	1	1						
Wm. J. Parks, . . . . .	Gloucester, .	1	1						
C. W. Allen, . . . . .	Gosnold, .	2	2						
R. L. and M. F. Black, . . . . .	Gosnold, .	2	2						
David P. Bosworth and I. W. Hall, . . . . .	Gosnold, .	2	2						
William R. V. Bosworth and Herbert A. Stetson, . . . . .	Gosnold, .	2	2						
Manuel Brown, . . . . .	Gosnold, .	1	1						
John Cornell, . . . . .	Gosnold, .	1	1						
Harold F. Deane, . . . . .	Gosnold, .	1	1						
Thos. B. Dowling, . . . . .	Gosnold, .	1	1						
George C. King, . . . . .	Gosnold, .	1	1						
John A. MacKay, . . . . .	Gosnold, .	1	1						
John Olsen, . . . . .	Gosnold, .	1	1						
George Priaulx, . . . . .	Gosnold, .	1	1						
Louis J. Ramos, . . . . .	Gosnold, .	1	1						
Russell W. Rotch, . . . . .	Gosnold, .	2	2						
Joseph V. Serpa, . . . . .	Gosnold, .	1	1						
Alpheus P. Tilton, . . . . .	Gosnold, .	2	2						
Charles W. Tilton, . . . . .	Gosnold, .	1	1						
D. C. Tilton, . . . . .	Gosnold, .	1	1						
Robt. R. Tilton, . . . . .	Gosnold, .	1	1						
Frank B. Veeder, . . . . .	Gosnold, .	1	1						
I. L. Vincent, . . . . .	Gosnold, .	1	1						
				\$10,467 00	4,568	\$8,938 00	132,109	\$34,880 25	2,023

S. V. Labrec,	Hull,	1	2	1,580 00	445	1,740 00	14,967	6,288 76	738
Ambrose B. Mitchell,	Hull,	1	3						
Ralph S. Place,	Hull,	1	1						
Hjalmar Roos,	Hull,	1	3						
J. Frank Blaney,	Manchester,	1	3						
Patrick J. Cleury,	Manchester,	1	1						
Augustus Ferreira,	Manchester,	1	1	1,615 00	314	1,090 00	11,901	5,288 84	107
Percy Hawkes,	Manchester,	1	1						
David M. Knight,	Manchester,	1	1						
Wm. F. Allen,	Marblehead,	1	2						
Charles O. Briggs,	Marblehead,	1	2						
Ernest Cronk,	Marblehead,	1	1						
Wm. H. Finch,	Marblehead,	1	1						
Charles H. Foss,	Marblehead,	1	1						
Arthur D. Frost,	Marblehead,	1	1						
J. Frank Gilbert,	Marblehead,	1	2						
J. G. Gilbert,	Marblehead,	1	1						
C. S. Hanson,	Marblehead,	1	2						
John A. Howe,	Marblehead,	1	2						
Louis Letourneau,	Marblehead,	1	2						
George C. Luscomb,	Marblehead,	1	2						
James H. Magee,	Marblehead,	1	1						
Wm. K. Melzard,	Marblehead,	1	2						
Harry A. Oliver,	Marblehead,	1	1	7,585 00	1,277	3,832 50	65,315	26,182 83	685
Joseph S. Phillips,	Marblehead,	1	2						
Augustus K. Roundy,	Marblehead,	1	1						
Richard Russell,	Marblehead,	1	2						
Charles H. Smith,	Marblehead,	1	1						
Howard S. Smith,	Marblehead,	1	2						
Ebenezer Snow,	Marblehead,	1	1						
John S. Stacey,	Marblehead,	1	2						
Wm. F. Standley,	Marblehead,	1	2						
William H. Sweet,	Marblehead,	1	1						
Wm. H. Tutt,	Marblehead,	1	2						
J. S. Withum,	Marblehead,	1	1						
Dana B. Blackman,	Marshfield,	1	2						
I. H. Bourne,	Marshfield,	1	1						
R. W. Bradley,	Marshfield,	1	2						
Oscar A. Chandler,	Marshfield,	1	3						
Howard H. Dunbar,	Marshfield,	1	1						

## Returns from Lobster Fisheries, 1920 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Harold E. Edson, . . . . .	Marshfield, . . . . .	1	1						
Norman G. Edson, . . . . .	Marshfield, . . . . .	1	1						
Clifford L. Goodwin, . . . . .	Marshfield, . . . . .	1	1						
George Graham, . . . . .	Marshfield, . . . . .	1	2						
Frank E. Harlow, . . . . .	Marshfield, . . . . .	1	2						
Charles H. Newton, Jr., . . . . .	Marshfield, . . . . .	1	3						
C. H. Newton, Sr., and Robert L. Newton, . . . . .	Marshfield, . . . . .	3	2	\$7,825 00	1,452	\$3,045 00	46,299	\$16,663 92	514
C. E. Peterson, . . . . .	Marshfield, . . . . .	1	2						
Charles R. Peterson, . . . . .	Marshfield, . . . . .	1	2						
Ephraim Pierce, . . . . .	Marshfield, . . . . .	1	2						
E. S. Publicover, . . . . .	Marshfield, . . . . .	1	2						
Lyman Sears, . . . . .	Marshfield, . . . . .	1	3						
S. G. Staples, . . . . .	Marshfield, . . . . .	1	1						
H. W. Tolman, . . . . .	Marshfield, . . . . .	1	2						
Melvin F. Ewell, . . . . .	Marshfield, . . . . .	1	2						
Wilfred Keene, . . . . .	Marshfield, . . . . .	1	1						
Henry C. Phillips, . . . . .	Marshfield, . . . . .	2	1						
Alton C. Taylor, . . . . .	Marshfield, . . . . .	1	3						
Gaetano Bongiorno, . . . . .	Nahant, . . . . .	1	1						
Toni Funolari, . . . . .	Nahant, . . . . .	1	2						
August Feleceetti, . . . . .	Nahant, . . . . .	1	1						
Fred Feleceetti, . . . . .	Nahant, . . . . .	1	1	1,410 00	410	1,080 00	29,007	3,381 53	54
Raymond Palombo, . . . . .	Nahant, . . . . .	1	2						
Carmine Roberts, . . . . .	Nahant, . . . . .	1	2						
W. A. Smith, . . . . .	Nahant, . . . . .	1	2						
John M. Taylor, . . . . .	Nahant, . . . . .	1	1						
Marcus W. Dunham, . . . . .	Nantucket, . . . . .	1	2						
Walter Jewett, . . . . .	Nantucket, . . . . .	1	2	2,020 00	211	530 00	6,301	2,596 41	68
Joseph Mayo, . . . . .	Nantucket, . . . . .	2	2						
Clinton F. Orpin, . . . . .	Nantucket, . . . . .	1	2						
H. L. Studley, . . . . .	Nantucket, . . . . .	1	2						



Anast. Angelo,	.	.	.	.	.	1	1	13,014 00	5,750	14,721 00	150,274	46,148 95	3,103
Alexander Avilla,	.	.	.	.	.	1	1						
Strafs Boza,	.	.	.	.	.	1	1						
Manuel Brown,	.	.	.	.	.	1	1						
George H. Butler,	.	.	.	.	.	3	3						
John Coraludes,	.	.	.	.	.	2	2						
Manuel Costa,	.	.	.	.	.	1	1						
Joseph S. Dutra,	.	.	.	.	.	1	1						
Geo. A. Faulkner,	.	.	.	.	.	1	1						
Joseph Ferreira,	.	.	.	.	.	1	1						
C. R. Freitas,	.	.	.	.	.	1	1						
Victorino P. Furtado,	.	.	.	.	.	1	1						
Manuel George,	.	.	.	.	.	1	1						
Joseph M. Gonsalves,	.	.	.	.	.	1	1						
John Kalaczewski,	.	.	.	.	.	1	1						
Anastos Koniz,	.	.	.	.	.	1	1						
Joseph Lima and Joseph Rego,	.	.	.	.	.	2	2						
Nick Martin,	.	.	.	.	.	1	1						
Charles P. Mattson,	.	.	.	.	.	1	1						
John Mason,	.	.	.	.	.	1	1						
Joseph P. deMello,	.	.	.	.	.	1	1						
Mariano deMello,	.	.	.	.	.	1	1						
Sam Mello,	.	.	.	.	.	1	1						
Francisco Moniz,	.	.	.	.	.	1	1						
Joseph Moniz,	.	.	.	.	.	1	1						
Victor Perry, Jr.,	.	.	.	.	.	2	2						
August Robiero,	.	.	.	.	.	1	1						
Manuel Roderick,	.	.	.	.	.	2	2						
S. M. Roderiques,	.	.	.	.	.	1	1						
Manuel F. Rose, Jr.,	.	.	.	.	.	2	2						
Manuel Severins,	.	.	.	.	.	1	1						
Manuel Sylvia,	.	.	.	.	.	2	2						
Joseph Sylvia,	.	.	.	.	.	1	1						
Antone A. Sylvia and Bartholomew Sylvia,	.	.	.	.	.	2	2						
Edward A. Sylvia and Edward A. Sylvia, Jr.,	.	.	.	.	.	2	2						
Frank Sylvia,	.	.	.	.	.	2	2						
Manuel E. Sylvia,	.	.	.	.	.	1	1						
Nicholas Volmas,	.	.	.	.	.	1	1						
Carlton L. Vceder,	.	.	.	.	.	4	4						
John Vento,	.	.	.	.	.	1	1						
August Vieira and Manuel Vieira,	.	.	.	.	.	2	2						
John Violet and John Demitri,	.	.	.	.	.	2	2						

## Returns from Lobster Fisheries, 1920 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Geo. Russell Littlefield,	Newburyport,	1	1	\$300 00	60	\$120 00	2,285	\$627 00	5
Daniel B. Gould,	Orleans,	2	2	310 00	80	320 00	1,650	1,237 50	40
Eugene H. Arnold,	Plymouth,	1	2						
Edwin H. Bartlett,	Plymouth,	1	1						
G. L. Binney,	Plymouth,	1	2						
Samuel B. Blackmer,	Plymouth,	1	2						
Albert W. Boutin,	Plymouth,	1	2						
Harry J. Boutin,	Plymouth,	1	2						
John A. Brierly,	Plymouth,	1	1						
David H. Briggs,	Plymouth,	1	2						
Laban B. Briggs,	Plymouth,	1	1						
Laban B. Briggs, Jr.,	Plymouth,	1	2						
James E. Burke,	Plymouth,	1	1						
Frank Carboni,	Plymouth,	1	1						
H. D. Carey,	Plymouth,	1	3						
H. J. Caswell,	Plymouth,	1	2						
Louis A. Cole,	Plymouth,	1	1						
William T. Darrick,	Plymouth,	1	1						
Albert A. D'Entremont,	Plymouth,	1	1						
Charles A. Dixon,	Plymouth,	1	1						
C. H. Dixon,	Plymouth,	1	1						
Edward L. Dixon,	Plymouth,	1	2						
George R. Ellis,	Plymouth,	1	2						
Wm. F. Farley,	Plymouth,	1	1						
Patrick H. Glynn,	Plymouth,	1	1						
Harold A. Hadaway,	Plymouth,	1	1						
E. F. Hayward,	Plymouth,	1	1						
J. R. Harlow,	Plymouth,	1	2						
George V. Hildreth,	Plymouth,	1	1						
Ralph B. Holmes,	Plymouth,	2	2						
Wm. H. Husband,	Plymouth,	1	1						
Ernest Johns,	Plymouth,	1	2						
G. W. Keith,	Plymouth,	1	1						
Irving W. Nightingale,	Plymouth,	1	1						
Henry L. Perry,	Plymouth,	1	1						
				8,557 00	2,301	7,648 50	97,864	30,492 45	1,278

[illegible]

## Returns from Lobster Fisheries, 1920 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Herbert R. Rich,	Raynham,	1	2						
Everett D. Rowe,	Raynham,	1	1						
Andrew Swanson,	Raynham,	1	1						
John L. Swanson,	Raynham,	1	2						
Samuel Thurston,	Raynham,	1	1						
George E. Wendell,	Raynham,	1	2						
Eugene J. Love,	Revere,	1	2	\$660 00	144	\$355 00	1,461	\$1,997 89	83
Charles W. Smith,	Revere,	1	2						
George W. Berry,	Salem,	1	2						
C. G. Bigwood,	Salem,	1	1						
George W. Dunn,	Salem,	1	1	1,360 00	328	1,097 50	9,988	3,250 90	33
Harold Dunn,	Salem,	1	2						
W. H. Foye,	Salem,	1	1						
Anthony J. Gonet,	Salem,	1	1						
Thos. F. Hogan,	Salem,	1	2						
Willard A. Fowler and W. W. Fowler,	Salisbury,	2	1	25 00	70	175 00	3,040	1,386 00	30
F. C. Burbank,	Sandwich,	1	1						
Eldred Eldvander,	Sandwich,	1	1						
Arthur S. Hamblin,	Sandwich,	1	1	55 00	52	41 20	5,955	2,565 87	1
Robert P. Nockel,	Sandwich,	1	1						
Oscar Anderson,	Scituate,	1	1						
A. L. Baker,	Scituate,	1	1						
Fred Bergman,	Scituate,	1	1						
Charles P. Curran,	Scituate,	1	1						
Martin Curran, Jr.,	Scituate,	1	1						
John F. Cushman,	Scituate,	1	1						
Charles DeCoste,	Scituate,	1	2						
C. Harry Driscoll,	Scituate,	1	1						
John F. Driscoll,	Scituate,	1	1						
George F. Dwyer,	Scituate,	1	1						



John Flynn, . . . . .	Settuate,	1	6,096 00	2,084	6,902 00	101,730	31,719 42	648
Joseph Flynn, . . . . .	Settuate,	1						
Wm. J. Flynn, . . . . .	Settuate,	1						
Richard Graham, . . . . .	Settuate,	1						
Eugene W. Haimes, . . . . .	Settuate,	1						
Thomas H. Harris, . . . . .	Settuate,	4						
Moses H. Jewells, . . . . .	Settuate,	1						
Oscar H. Leavitt, . . . . .	Settuate,	1						
Fred G. McCarthy, . . . . .	Settuate,	2						
John Nee, . . . . .	Settuate,	1						
John J. O'Hern, . . . . .	Settuate,	1						
Christopher O'Neil, . . . . .	Settuate,	1						
Christopher O'Neil, Jr., . . . . .	Settuate,	1						
Martin J. Quinn, . . . . .	Settuate,	1						
Albert E. Reed, . . . . .	Settuate,	1						
Samuel F. Smith, . . . . .	Settuate,	1						
Danforth P. Sylvester, . . . . .	Settuate,	1						
C. Bertram Tilden, . . . . .	Settuate,	1						
Henry P. Tobin, . . . . .	Settuate,	1						
Thos. S. Turner, . . . . .	Settuate,	2						
Edward Ward, . . . . .	Settuate,	1						
James W. Welch, . . . . .	Settuate,	1						
Richard Wherity, . . . . .	Settuate,	1						
Frank H. Young, . . . . .	Settuate,	1						
Fred Blanchard, . . . . .	Swampscott,	1	4,090 00	702	2,823 00	27,412	10,803 84	243
Raymond E. Bond, . . . . .	Swampscott,	2						
Walter M. Boyden, . . . . .	Swampscott,	2						
Dirk Bruggink, . . . . .	Swampscott,	1						
Charles M. Caboon, . . . . .	Swampscott,	1						
N. P. Codwise, . . . . .	Swampscott,	3						
Chester W. Cook, . . . . .	Swampscott,	1						
Charles N. Ducey, . . . . .	Swampscott,	2						
James W. Kehoe, . . . . .	Swampscott,	1						
Walter L. Kehoe, . . . . .	Swampscott,	1						
Leonard T. Lewis, . . . . .	Swampscott,	2						
Harry R. Rouse, . . . . .	Swampscott,	2						
Ernest B. Thing, . . . . .	Swampscott,	2						
Richard A. Thurston, . . . . .	Swampscott,	1						
Alfred G. Watts, . . . . .	Swampscott,	1						
Alfred W. Watts, . . . . .	Swampscott,	2						

## Returns from Lobster Fisheries, 1920 — Concluded.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Norman G. Benson, . . . . .	Tisbury, .	S	S						
C. B. Cleveland, . . . . .	Tisbury, .	1	1						
E. W. Cleveland, . . . . .	Tisbury, .	1	2						
J. R. Cleveland, . . . . .	Tisbury, .	1	-						
Morris C. Cleveland and Benj. F. Cleveland, . . . . .	Tisbury, .	2	1						
Lester D. Mayhew, . . . . .	Tisbury, .	1	1						
Manuel K. Rose, . . . . .	Tisbury, .	1	2						
Welcome L. Tilton, . . . . .	Tisbury, .	S	S	\$1,615 00	300	\$321 50	14,482	\$3,972 33	303
Lester A. Bowman, . . . . .	Westport, .	2	2						
Henry P. Brayton, . . . . .	Westport, .	1	1						
Albert Brownell, . . . . .	Westport, .	1	1						
Arthur R. Cornell, . . . . .	Westport, .	1	2						
Milton E. Earle, . . . . .	Westport, .	1	1						
Joseph S. Field, . . . . .	Westport, .	1	1						
John R. Fish, . . . . .	Westport, .	1	-						
J. R. Fish, Jr., . . . . .	Westport, .	1	3						
Frank D. Grinnell, . . . . .	Westport, .	1	1						
Herman A. Hart, . . . . .	Westport, .	1	1						
William S. Head, . . . . .	Westport, .	1	1						
Frank G. Macomber, . . . . .	Westport, .	1	1	6,870 00	1,294	3,672 00	56,635	15,731 43	702
John Jenkinson, . . . . .	Westport, .	1	1						
Akira S. Nickerson, . . . . .	Westport, .	1	1						
Frederick W. Palmer and Henry S. Palmer, . . . . .	Westport, .	2	1						
Isaac B. Pettey, . . . . .	Westport, .	1	2						
H. A. Soule, . . . . .	Westport, .	1	2						
Ralph W. Wood, . . . . .	Westport, .	2	2						







The Commonwealth of Massachusetts

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ANNUAL REPORT

OF THE

DIVISION OF FISHERIES AND GAME

FOR THE

YEAR ENDING NOVEMBER 30, 1921

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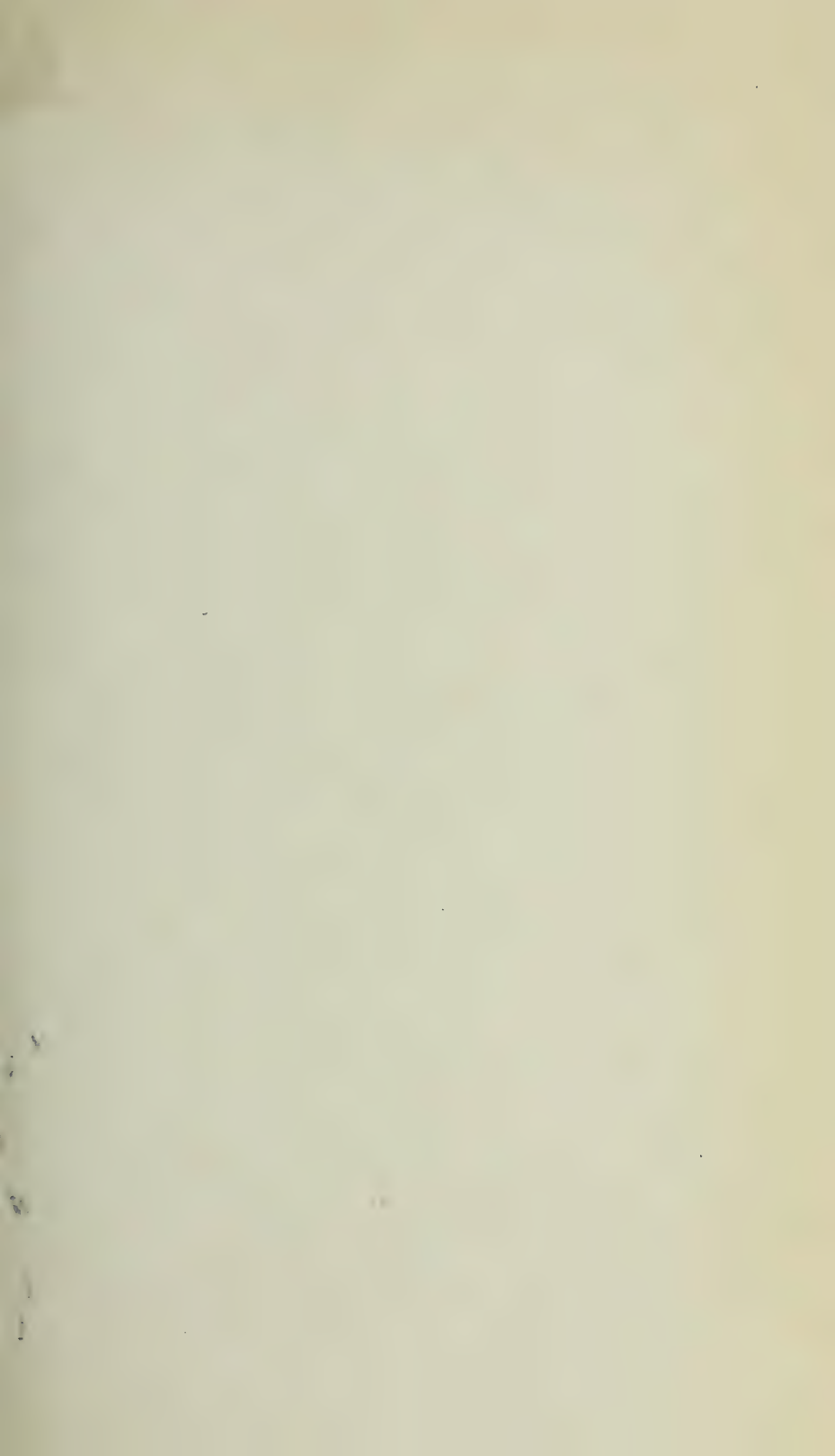
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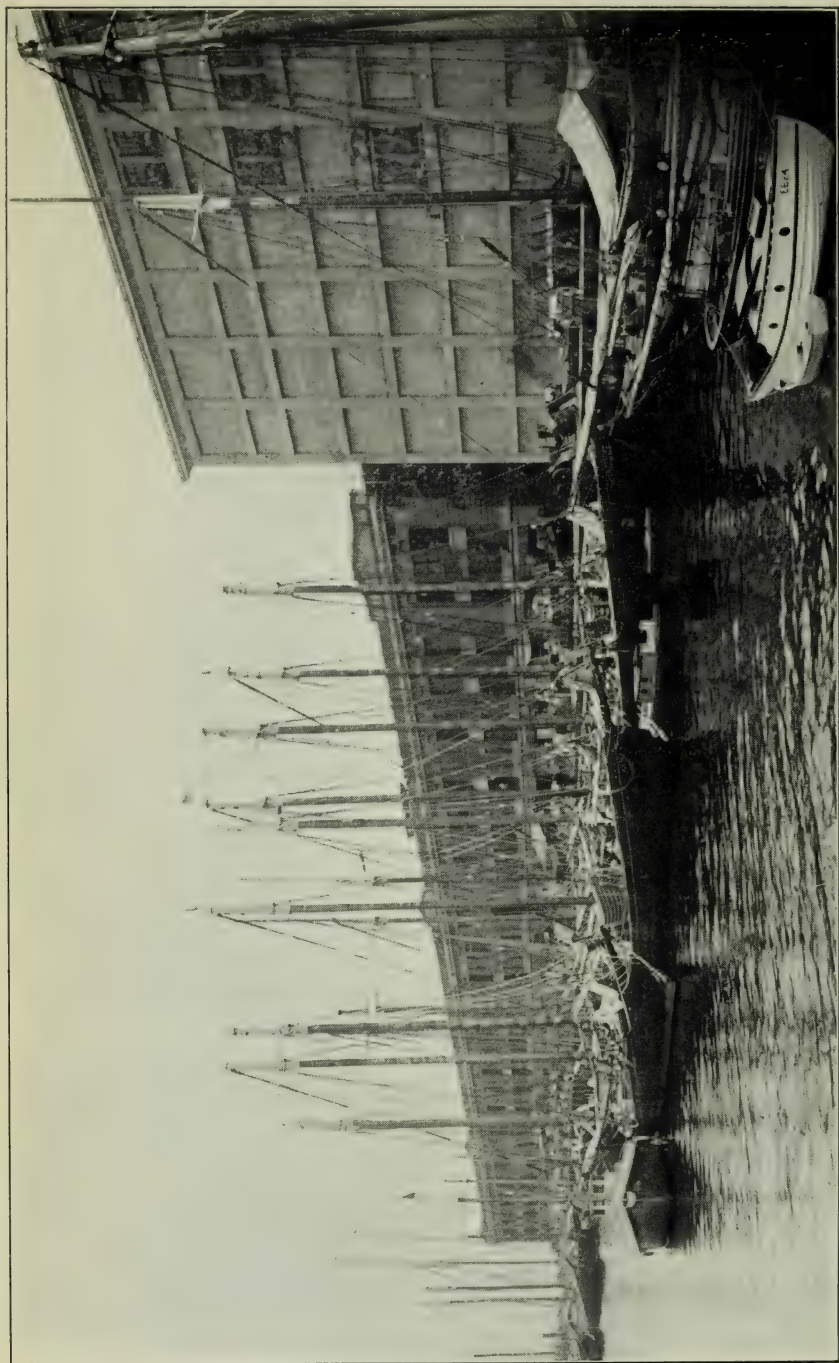


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West side view of the Boston Fish Pier, largest fresh fish wharf in the world, showing fish stores and vessels discharging fares. At the right, end of Commonwealth Ice and Cold Storage Company's freezer; capacity, 15,000,000 pounds, accounted the largest in the country. (Cut used by courtesy of Whitman, Ward & Lee, wholesale fish dealers, Boston Fish Pier.)



The Commonwealth of Massachusetts

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ANNUAL REPORT

OF THE

DIVISION OF FISHERIES AND GAME

FOR THE

YEAR ENDING NOVEMBER 30, 1921

---

*Mass.* DEPARTMENT OF CONSERVATION *Division of*  
*fisheries and game*



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## DEPARTMENT OF CONSERVATION.

---

**Commissioner.**

WILLIAM A. L. BAZELEY.

---

## DIVISION OF FISHERIES AND GAME.

---

**Director.**

WILLIAM C. ADAMS.

**Inspector of Fish.**

ARTHUR L. MILLETT.

**Secretary.**

MISS L. B. RIMBACH.

**Chief Fish and Game Warden.**

ORRIN C. BOURNE.

**License Clerk.**

W. RAYMOND COLLINS.

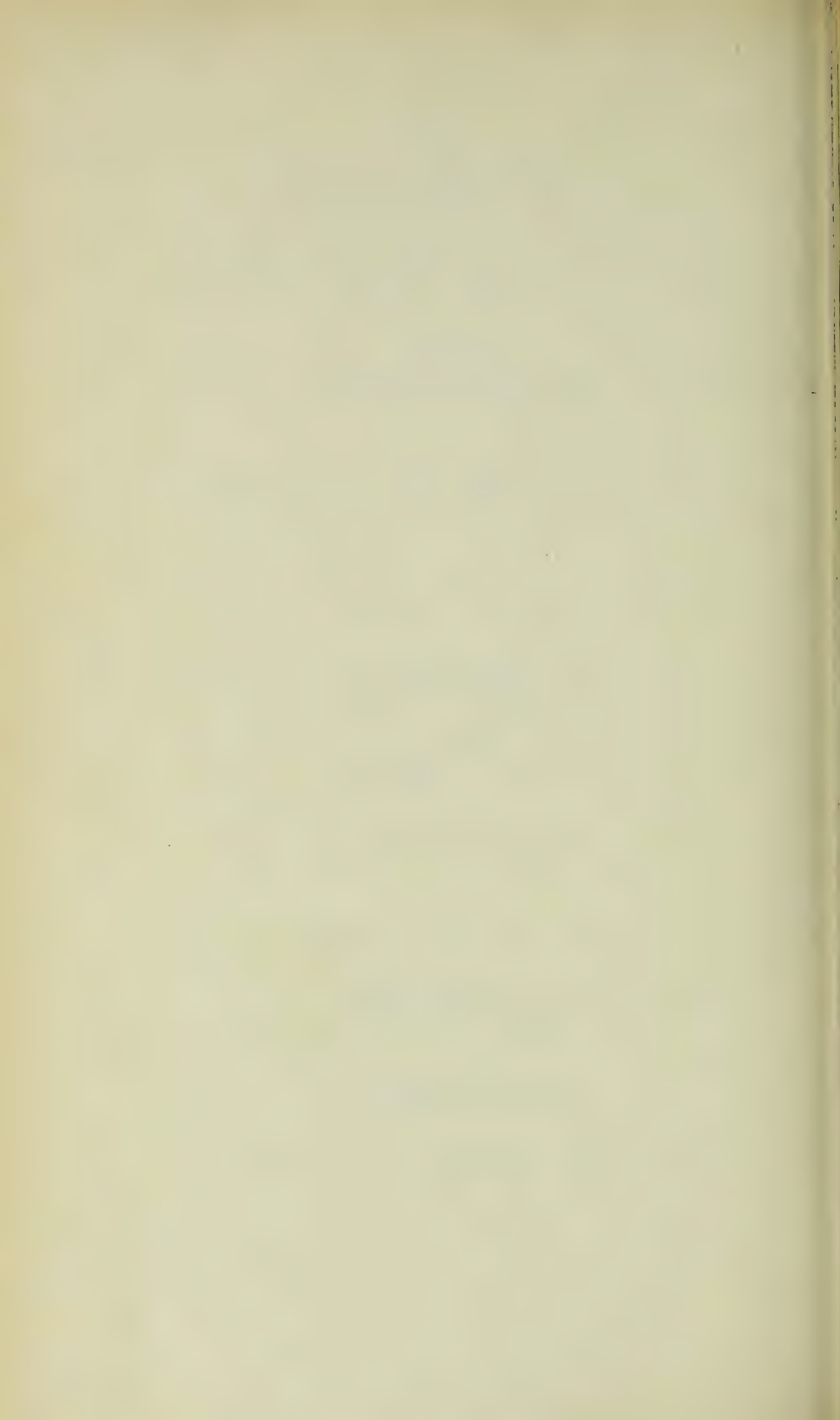
**Supervisor of Distributions.**

JAMES A. KITSON.

**Biologist.**

DAVID L. BELDING.

OFFICE: ROOM 506, State House, Boston, Mass.





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## The Commonwealth of Massachusetts

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The Director of Fisheries and Game herewith presents the fifty-sixth annual report.

### GENERAL CONSIDERATIONS.

One of the surest guarantees that straight thinking will be employed in solving the problems of maintaining and increasing the wild life resources of a State or country is the result which will flow from pausing to make a survey of existing stock, the agencies at hand with which to care for it, the state of public sentiment with relation to it, and the demands of the future. It is useless to inveigh against the profligacy with which this great wealth has been squandered in the past, save for the lessons that may be drawn for present and future guidance. While we take pride in contemplating the amount of wild life still remaining in our comparatively small State, such pride must be fully tempered by the realization that even we, who have had and still possess one of the most enlightened public opinions on this continent, have wasted our substance in riotous living.

Massachusetts has over 400 miles of coastline, within the 3-mile limit of which lies one of the most valuable coastal fisheries in the world, one of the most valuable shellfish tracts in the world, and one of the finest wild-fowl shooting areas on the North American continent. It would challenge the imagination of the most resourceful romancer to describe the conditions which existed on those areas when the country was first discovered, — the vast quantities of anadromous fish which ascended our streams to the breeding grounds; the annual visitation to our shores of other migratory fish; the great areas of shellfish existing in an abundance that appeared inexhaustible, together with the countless thousands of shore birds and water fowl which either bred within the area or stopped on it some time in their migrations. To-day (with the exception of the alewife) the fish no longer ascend the streams; the shellfish areas have been greatly restricted; certain species of

shore birds and wild fowl have become extinct; and as to the others, the depletion has been arrested almost at the vanishing point. The one basic fact to be deduced from all this is, the hand of man has taken it away, and the hand of man must restore it if it is ever going to be restored.

The devastating factors are so many, the prospect for further restrictions in breeding grounds and sanctuaries so great, that in many of its larger phases the work appears to be almost hopeless. It is not reasonable to expect that the original conditions can be restored, and it is unprofitable to mourn over departed glories, and useless to dream of future conditions. We have arrived at a point where it is necessary to appraise the present stock; to understand conditions as they exist; to relinquish our hopes of bringing back many species; to select those which have survived and give promise of being able to meet even heavier competition in the fight for existence; to classify the agencies with which the work may be done; and to go forward resolutely in the plan of rehabilitation.

In the course of such a survey we are confronted with such facts as the following. The streams which were the principal breeding grounds of certain salt-water fish are crossed by impassable barriers. The water is so polluted that it is questionable whether the fish life can exist. All our streams which have been or are of sufficient size to constitute the large breeding areas have on their banks to-day large cities, and in addition, innumerable manufacturing plants, sawmills and other activities, — all depositing their share of pollution into these great highways to the sea.

The shellfish areas have been greatly restricted by the encroachments of civilization, and those remaining are further threatened by the menace of existing problems of pollution, the most dreaded of all (of recent appearance) being the rapidly increasing deposits of chemicals and oils on the flats. By drainage and diversion of water courses many shellfish areas have been completely wiped out. Further tracts which are contiguous to the outlets of rivers have been permanently ruined by the precipitation of pollution on them, or are to-day prohibited ground by reason of the presence of pollution. Other areas are being rapidly eliminated through the accumulation of

oil and other trade wastes which are gradually being deposited. In the towns bordering coastal waters, while the problems of development of the shellfish fisheries are substantially identical, the sets of rules and regulations are almost as many and diverse as the number of towns along the shore. Far-reaching development is hampered by petty local political considerations, with the result that during the past generation very little has been done to insure a permanent, businesslike and economic development.

The breeding and resting grounds of the shore birds and wild fowl have been equally restricted. Great areas of swamp and marsh have been drained and turned to purposes of agriculture, while others have been made uninhabitable by the constant presence of man. To the natural agencies of destruction have been added the practically inestimable losses wrought by man in the course of the annual migration. To all these must be added inadequate laws, absence of any protection whatever in certain respects, and the prospect of increased rather than decreased destruction.

The foregoing by no means includes all elements in any part of the survey, but sketches the general trend.

The remedies which should be applied are fairly easy to enumerate but the application of them is immediately recognized as difficult, — some by reason of their conflict with commercial interests, some because of interference with local political interests, some because they antagonize the wishes of a certain class which desires to exploit for immediate personal advantage, and some because they curb that impulse, which seems to be ingrained in the average human being, to kill all other forms of life indiscriminately.

Pollution of all kinds injurious to fish life should be removed from our coastal waters. Fishways should be installed to insure access to spawning grounds. The waste now emptied into our rivers from cities and manufactories should be diverted to reclamation plants. This would cost millions of dollars and delay economic development of vast proportions. While the population would undoubtedly benefit very substantially from the reclamation of these wastes, it is argued in many quarters that such benefit, together with the profit from the fisheries,



would not compensate for the cost of putting the whole into operation, even viewed over a period of many years. There are certain streams which have been carrying pollution for decades. The sides and bottom of those streams have become so thoroughly impregnated that it is a question whether they could ever be restored. The presence of existing pollution in our streams has been too often used as an excuse for not taking action. As illustration, it was contended by eminent scientists that the pollution in the Merrimack River was such that no anadromous fish would ascend its waters, even if fishways were provided over the obstructions at Lawrence and Lowell. The fishway at Lawrence was completed during the past spring, and a substantial number of alewives were noted in the fishway and successfully passing through it to the upper reaches of the river. But our answer is, viewed in the light of one hundred years or five hundred years, the salvage of these by-products which to-day are trade waste and sewage, which have all the elements of the highest quality of fertilizer, will be profitable, and will far outweigh the present or prospective economic losses of delayed development incident thereto. Again, it is desirable that the great annual precipitations, which to-day quickly run to the sea, should be collected in vast reservoirs from which great units of power may be developed. These reservoirs would take the place of many of the present non-producing areas, and in their waters, kept free from pollution, great quantities of fish could be annually produced, to say nothing of the inestimable benefits to be derived from the recreational aspects of the case. In all probability there will never be any more streams or rivers, but there can be almost any number of additional bodies of water.

As to the shellfish, practically all the defilement previously described must be removed. Certain areas, such as a portion of the flats of Boston Harbor, those lying contiguous to New Bedford, and others, may have to be permanently abandoned. But even with the amount of shellfish area remaining there is the possibility of great economic development under business methods and standardized practices. The shellfish areas should be surveyed and portions set aside for public fishing. The rest should be leased in suitably



sized areas to individuals for shellfish farming. The lease should cover a period of ten to fifteen years, this being long enough to induce intensive cultivation. It should contain provisions prohibiting transfer without the consent of the lessor; for its cancellation in case of failure to do a certain amount of constructive work each year; and (in case of death of a lessor) for payment to his estate by his successor of the value of his work. Suitable markers should show the boundary lines between holdings. It is a mooted question whether the control of these areas should be taken from the local boards and placed with a central State agency. But the selection of the administrative agency is of secondary importance to the need of placing the chosen agency in a position to go forward with a constructive program. Further research work should be carried on to make possible the distribution of these products in their fresh state over a greater area, and to see how far they may be manufactured into food commodities which can be distributed to all needed distances.

With respect to the shore birds and wild fowl, certain areas should be set apart at suitable intervals along the coast, from Cape Ann to Provincetown, and on the outlying islands, to be permanent bird sanctuaries in which all shooting would be prohibited. They should be patrolled against poachers, and such vermin as is found thereon should be exterminated. Such an arrangement is entirely practicable without restricting unreasonably the opportunities for hunting, and the taking of all of the most favorable grounds is not contemplated.

To-day the land around most of our great ponds has come under private ownership for developing the shooting privileges, with the result that the opportunities for the public generally to shoot are being more and more restricted. Therefore it would be reasonable, and highly desirable, for additional favorable areas along the shore to be acquired by the State for public shooting grounds, where, under reasonable regulations, any resident of the Commonwealth who has assumed the full duties of citizenship may have equal opportunities for sport. As time goes on the benefits to be derived from establishing "rest days" on which no shooting would be permitted will undoubtedly become more apparent. Likewise the stopping of

all shooting at noon on the days of open season will increase rather than diminish the number of birds actually taken in a season. While these birds, with the exception of the black duck, are migrants, and stop for a comparatively short time within our borders, nevertheless, with the exception perhaps of the geese, most of them will feed. The further development of the food supplies on all of these areas, as well as those under private control, will be an increasing factor in stopping and holding larger numbers of birds. There are still left many swamps and flooded areas along our sluggish streams, which are to-day the breeding grounds of large numbers of black ducks. It would be to the lasting benefit of the sport within the State were many of these areas acquired by the State and made permanent breeding grounds and sanctuaries. And inland, as well as along the shores, the substantial areas which are now being acquired as State forests should be supplemented by the acquisition of such tracts as are intended primarily for the use of birds and quadrupeds.

#### PERSONNEL.

The term for which Director William C. Adams had been appointed expired Dec. 1, 1920. On Nov. 24, 1920, His Excellency nominated him for reappointment for a term of three years. The nomination was confirmed on Dec. 1, 1920.

#### FINANCES.

The problem before the ways and means committee of the General Court of 1921 was no small one. His Excellency the Governor, in his budget recommendations, laid special stress on the alarming financial condition of the Commonwealth, — namely, that though the total departmental requests had been reduced by more than \$12,000,000, the budget showed required expenditures of \$17,000,000 more than estimated available receipts. The control of the mounting costs of government was imperative, and drastic cuts in all departments inevitable. On the announcement of the budget (March 9, after over three months of the fiscal year had passed) an immediate review of the divisional finances showed a serious situation in the ap

propriation for the propagation of game and fish, and field activities.

The amount allotted for the present year's work was \$82,650, — \$3,158.56 less than actual expenditures of 1920. We had been obliged to place orders for fish cans, \$3,100, and trout eggs, \$4,735.55 (the latter to replace stock killed by disease at the East Sandwich station). These unusual expenditures and the foregoing cut reduced the amount actually available for the remainder of the year to a sum which was \$10,994.11 less than the previous year's expenditures. Hence in redrafting the financial program, in the light of the budget announcement, we found ourselves compelled (after making provision for running the stations to the end of the year, said provision involving the most drastic cuts possible to make and still keep the plants going) to make no distribution of white perch, no field collections of horned pout and bass fry, and to do no work on wall-eyed pike or salt-water smelt. The sum set aside for lobster work (handling egg-bearing and short lobsters) was reduced 60 per cent, the allotment for fish distribution reduced to a minimum, and a contract for 1,500 young pheasants at \$3,000 canceled. Two permanent employees were dropped, and no extra labor authorized at the stations. Despite these cuts it was necessary to go still further, and arrangements were made to close the Wilbraham game farm after July 1. Only through these curtailments could we keep within the amount appropriated. But the necessity for closing the Wilbraham game farm was avoided by a cancellation of certain items allowed in the budget for new construction work at other stations with a corresponding increase in the appropriation for fish and game propagation.

So imperative was the need of keeping the State expenditures to the minimum that in the course of the year His Excellency appealed to the heads of departments, urging them not only to exercise care to keep within appropriations, but to turn back balances at the close of the year. Pursuant to this request the Division of Fisheries and Game turned back a total of \$8,580.94, or 4+ per cent of the entire available funds for the year.



	Available 1920 Balances and Amounts appropri- ated in 1921.	Expended during 1921.	Balances Nov. 30, 1921 (which revert to treasury).
<i>Appropriations for Maintenance.</i>			
Salary of the Director . . . . .	\$4,000 00	\$3,999 96	\$0 04
Services of office assistants . . . . .	8,600 00	8,314 51	285 49
Expenses . . . . .	11,600 00	10,060 06	1,539 94
Exhibitions . . . . .	1,000 00	742 18	257 82
Enforcement of laws:			
Personal services . . . . .	57,000 00	56,645 76	354 24
Expenses . . . . .	18,300 00	17,236 83	1,063 17
Biologists:			
Personal services . . . . .	4,740 00	4,508 22	231 78
Expenses . . . . .	2,400 00	1,977 05	422 95
Propagation of game birds, animals and food fish .	85,650 00	84,032 32	1,617 68
Marine fisheries:			
Personal services . . . . .	5,630 00	5,085 35	544 65
Expenses . . . . .	1,400 00	849 71	550 29
	\$200,320 00	\$193,451 95	\$6,868 05
<i>Special Appropriations and Balances available from 1920</i>			
Marshfield bird farm . . . . .	\$2,500 00	—	\$2,500 00*
Certain improvements, etc. (chapter 225, Acts of 1920):			
Marthas Vineyard Reservation . . . . .	400 00	\$398 84	1 16
Montague rearing station . . . . .	537 89	529 07	8 82
Palmer hatchery . . . . .	2,295 30	2,288 88	6 42
Sandwich hatcheries . . . . .	106 53	105 48	1 05
Wilbraham game farm . . . . .	466 35	451 74	14 61
Amherst rearing station . . . . .	48 53	45 45	3 08
Fishways (balance of appropriations 1918 and 1919) .	5,683 23	4,005 48	1,677 75
	\$12,037 83	\$7,824 94	\$4,212 89
Totals for maintenance . . . . .	\$200,320 00	\$193,451 95	\$6,868 05
Totals for special purposes . . . . .	12,037 83	7,824 94	4,212 89
Grand totals . . . . .	\$212,357 83	\$201,276 89	\$11,080 94
*Available in 1922 . . . . .	—	—	2,500 00
Returned to general treasury . . . . .	—	—	\$8,580 94



The following is the revenue received resulting from the activities of the Division of Fisheries and Game for the fiscal year ending Nov. 30, 1921, and turned into the treasury of the Commonwealth: —

Licenses (see analysis below)	\$112,184 15
Sales of materials at game farms and hatcheries	141 10
Sales of game tags	13 60
Sales of forfeited guns	75 00
Sales of forfeited deer	517 58
Sales of forfeited ducks	20 00
Sales of forfeited skunk skins	3 75
Lease of Chilmark Pond	75 00
Lease of clam flats (chapter 710, Acts of 1912)	220 00
Interest on deposits	12 93
	<hr/>
	\$113,263 11

*Analysis of License Returns.*

FORM OF LICENSE.	Total Number issued.	Gross Value.	Fees to Clerks.	Net Return to State.
Resident citizen's combination at \$1	99,671	\$99,671 00	\$14,965 50	\$84,705 50
Non-resident citizen's combination at \$10	365	3,650 00	54 75	3,595 25
Non-resident citizen's combination at \$1	262	262 00	39 30	222 70
Alien foreign-born combination at \$15	155	2,325 00	23 25	2,301 75
Minor trappers at 25 cents	4,142	1,035 50	621 30	414 25 <sup>1</sup>
Resident citizen's fishing at 50 cents	44,425	22,212 50	6,663 75	15,548 75
Non-resident citizen's fishing at \$1	3,765	3,765 00	564 75	3,200 25
Non-resident citizen's fishing at 50 cents	100	50 00	15 00	35 00
Alien foreign-born fishing at \$1	1,540	1,540 00	231 00	1,309 00
Lobster fisherman's at \$1	1,002	1,002 00	150 30	851 70
Totals	155,427	\$135,513 00	\$23,328 90	\$112,184 15 <sup>1</sup>

<sup>1</sup> Minor trappers overpaid 5 cents.

By the increase of the fees for hunting and fishing licenses, to take effect Jan. 1, 1922, the income to the Commonwealth from this source will be considerably augmented. The present tendency is to regard hunting and fishing as a luxury, the burden of maintaining which should be borne in greater measure than is now the case by those directly benefiting. The new license law is the result of a recommendation of the ways and

means committee, following the request of His Excellency for the discovery of new sources of revenue, or the establishment of old activities on a self-supporting basis.

#### CONFERENCE.

More and more we realize the value of close contact between the men and women who are using and enjoying the wild-life resources and the officials administering them. The gathering of the sportsmen at the State House for an informal talk has become an annual feature, following which many misunderstandings and fancied wrongs disappear. The natural rivalries of the different sections are allayed to a greater extent than would otherwise be the case, through personal contact and the discussion of common interests rather than sectional differences. The meeting of Jan. 7, 1921, was attended by 200 persons, and 25 associations sent representatives. The meeting was addressed briefly by Commissioner Bazeley, Director Adams, Fish Inspector Millett and State Ornithologist Forbush, each speaking in his particular line. The afternoon session was addressed by Governor Channing H. Cox. The range of discussion was wide, but stress was laid chiefly on these propositions:

- Regulation of pond fishing during the months for wild-fowl shooting.
- Penalizing hunters or fishermen who damage private property.
- Restriction of winter fishing and closed seasons, and bag limits on certain species.
- Increase in hunting and fishing license fees.
- Regulations for open season on pheasants.

#### ACTIVITIES OUTSIDE THE STATE.

The Director attended a meeting of the Advisory Committee to the Department of Agriculture on the Migratory Bird Treaty Act in Washington January 27.

At the annual meeting of the American Game Protective Association in New York January 24 and 25, attended by the Director and by Supt. L. B. Sherman of the Marshfield bird farm, the latter described his method of producing pheasants wholly by the use of incubators and brooders, illustrated by motion pictures.

The conference in Washington, D. C., on June 16, for the consideration of measures for the prevention of water pollution and the protection of migratory fishes and other migratory marine animals through Federal control of the fisheries or closer co-operation between the States, called by Hon. Herbert Hoover, Secretary of Commerce, was attended by Inspector of Fish Arthur L. Millett.

The Director and the Inspector of Fish were in attendance at the meetings of the American Fisheries Society September 5 to 7, and of the International Association of Fish, Game and Conservation Commissioners September 8 and 9 at Allentown, Pa.

The Director was delegated by His Excellency to represent the Commonwealth at the annual convention of the United States Fisheries Association at Atlantic City, N. J., September 16 and 17. The formation of this association three years ago was a step of far-reaching importance to the commercial fisheries industries. Its practical result has been a joining of forces of the members of this great industry in the common aim of improving conditions in all branches of the industry, and unity of action in place of the hitherto each-for-himself policy. The meeting at Atlantic City was a nation-wide gathering, at which the foundation was laid for practical plans for effecting improvements in the handling of fish, better organization of the industry, increased distribution of fish, and for the better protection of those species which include the fishes of commerce.

#### ASSOCIATIONS.

The associations interested in the sports of hunting and fishing number about 100, with a membership of upward of 12,000. Their contributions to the cause this year presented no novel features, but comprised the usual diversity of activities, such as membership campaigns, lectures and publicity work, distribution of State-raised stock, the hatching of game and rearing of trout fry to fingerlings at rearing plants maintained by the clubs. A number of associations bought and liberated white hares; a good many purchased and released a portion of the 3,000 young pheasants for which the Division had contracted before the necessity of rigid economy became known.

Thus the covers received this stock and the Division was relieved of the obligation. Two of the clubs distributed special posters (mentioned in more detail in the section on posted land). Another (with the assistance of the Division's seining crew) seined certain ponds in Falmouth, redistributing in other local ponds the white perch thus secured. Another proffered the services of a number of members for construction work at our rearing station.



### EDUCATION AND PUBLICITY.

Following its belief in the truth of the old saying that "no law is stronger than the public sentiment behind it," the Division has pushed forward along educational lines as rapidly as resources, both of time and money, would permit.

Our most effective method of arousing public interest in the conservation of natural resources is by stereopticon and moving-picture lectures before fish and game associations, clubs, church societies and other groups of persons seeking further information on this important subject.

The burden of this work falls on the central office, and during the year the chief warden alone has delivered 77 lectures in all parts of the State. Additional lecture work has been done by the Director and other members of the Department. The demands for return engagements testify to the popularity of this work. Many of the talks enumerated above were delivered before schools, and the district wardens have, whenever requested, appeared before the schools to train the young minds along conservation lines, and make clear the need for wild-life protection.

Heretofore the lectures have been given free, but present financial circumstances may compel us to request the payment of actual traveling expenses of the lecturer.

In the exhibition of live and mounted specimens of fish and game at county fairs it was necessary to limit the work to eight fairs, — namely, Worcester, Fitchburg, Greenfield, Springfield, Northampton, Great Barrington and Brockton, and the one held within the grounds of the State Colony at Gardner. At the Eastern States Exposition at Springfield the fine facilities afforded in the west wing of the Massachusetts State building, which was assigned to the Division's exclusive use, made a specially good showing possible. While we would be glad to continue and to extend this work, there are many drawbacks to be contended with, among which may be mentioned: the elimination of certain propagating activities at the stations has curtailed available exhibits; the exhibition of game birds or

fish practically spoils them for breeding; the fairs are held at the season when the wardens (who erect and supervise the exhibits) should be patrolling their districts; and, last but not least, each exhibit entails a large expense. Therefore it would not be surprising if sooner or later the exhibition work were abandoned.

### ENFORCEMENT OF LAWS.

Owing to curtailment (mentioned elsewhere) of certain hatchery and fish salvage operations, the wardens spent more time than usual in the field on law-enforcement work. This relief from distribution tasks meant a closer watch for violations, and consequently more convictions before the courts. In general, the wardens have faced the same problems and difficulties as in former years, but, profiting by past experiences, they have handled them creditably.

### PERSONNEL.

Warden Fred R. Ziegler of Pittsfield (who resigned in 1920 to enter private business) returned to the force on Jan. 1, 1921, greatly to the satisfaction of the Division and of the sportsmen of the Central Berkshire District which was formerly, and is once more, his district.

Raymond J. Kenney of Lowell was designated deputy chief warden, to assume responsible charge of law-enforcement activities in the absence of the chief warden.

Harold L. Crosby of Dracut, formerly working at large, was assigned to a district radiating from Lowell, and Warden Edward Babson, formerly working at large from Gloucester, was given a district in northern Essex County. These changes relieve other wardens of overlarge districts. Warden Elisha T. Ellis of North Easton is the only man "at large." On account of the location of his home, and the fact that he operates a State machine, it was considered best to leave him to assist the four other wardens in that locality, with whom he can easily work. Wardens James A. Peck, formerly of Falmouth, and William E. Wheeler, formerly of Fitchburg, exchanged districts on September 1 at their own request, and the new districts have proven more suited to their personal likings.

Approximately 25 cities and towns have asked for the appointment of wardens for their municipalities under the act which provides for this. A small salary is paid by the town. These local men have shown a creditable interest in the enforcement of the fish and game laws.

Many interested persons have volunteered their services as wardens without pay, and some have done excellent work in conjunction with the regular men. Others have less time to devote to the work, but the fact that they hold this authority and are interested in the protection of wild life has had a deterrent effect on would-be violators. The Division appreciates the spirit with which these volunteers work, even though no remuneration is received. The present force of volunteers, 275, shows an increase of 75 over last year.

#### EQUIPMENT.

The Division is pleased to acknowledge the gift of a Ford touring car to Warden Frederick W. Goodwin of East Boston by the Middlesex Sportsmen's Association of Arlington, to enable him to better cover his territory. This is co-operation of the most practical nature. With our force badly handicapped by lack of transportation, gifts of this nature by the associations constitute the finest kind of help.

Realizing the value of independent transportation in their work, ten of the district wardens have provided themselves with cars at their own expense. The allowance which our appropriations permit us to give them is insufficient to pay running expenses, and in their interest in the work some wardens have operated their cars at a loss. The use of the wardens' personal cars, together with the four owned by the State and used on law-enforcement work, demonstrates conclusively that without them our men are unable to cope with the motorized violator of to-day, or to effectively cover the outlying sections of their districts.

All wardens are now supplied with standardized revolvers, handcuffs, field glasses and other necessary police articles and personal equipment.

#### CO-OPERATION.

We acknowledge with thanks the assistance received from the Department of Public Safety through the use of the steamer "Lotus," under the command of Capt. Frank G. Wright. Operations were principally along the North Shore and in Lynn Harbor, where many complaints had been received of



persistent unlawful seining and torching by alien fishermen. On October 19, after several attempts unsuccessful on account of mishaps and weather conditions, a number of wardens, working with Warden Thomas L. Burney, took three boats with their crews into custody. The next day the captain of each of the three boats agreed to pay a fine of \$50, and the cases against the members of the crew were placed on file. Without the assistance of Captain Wright and his boat, and the help of P. C. Saunders, harbor master of Lynn, this accomplishment would have been impossible. During the raid Mr. Saunders' boat was badly damaged. We gladly give Messrs. Wright and Saunders the lion's share of the credit for stopping this form of violation.

This incident, taken with many other violations along the shore, emphasizes the need of a boat to be owned and operated by the Division. Without one we can never hope to effectively enforce the laws along the waterfront. This is not meant in any way as a criticism of the Department of Public Safety, for they have unselfishly given assistance on request whenever possible, but they cannot be expected to forsake their duties whenever called on to lend a hand in our work.

With the advent of the new State Police patrol into the field of law-enforcement work, more co-operation is to be looked for. On October 25 the chief warden addressed the members at their barracks at Framingham on the enforcement of the fish and game laws, and the troop commander gave assurances of their willingness to help.

It is a great satisfaction to observe the excellent support received by our wardens from the courts, where it is being realized more and more that prosecutions are made only as a last resort to preserve wild life and uphold the laws. This co-operation is a source of much satisfaction to an officer who has worked, perhaps, long hours to apprehend a persistent violator.

As time goes on, too, it is found that a greater degree of co-operation is being received from the public as a whole. With only thirty-one men to cover the length and breadth of the State, it is necessary that every citizen who prides himself on his public spirit should report all violations coming to his notice. And, considering the large territory covered by our

men and the handicaps under which they labor, it is unfair to criticise their work unless this assistance is forthcoming. Such information is always held strictly confidential. In addition to reporting violations, a sportsman having the interests of the wild life sincerely at heart should be willing to testify in court as to violations committed in his presence, for many weeks of watchful waiting on the part of the officer might be required to get evidence of the same violation by the same party a second time. Every true sportsman prides himself on observing the laws to the letter, and the man who takes part in bringing the offender to justice need never fear that the best type of sportsman and citizen will consider it a blot on his reputation. United public sentiment behind any law or group of laws is much more effective than to police the State with a thousand men.

### COURT CASES.

#### *Classified Court Cases, 1921.*

VIOLATIONS.	Fines imposed.	Costs imposed.	Number of Cases.	DISPOSITION.			
				Discharged.	Convicted.	Appealed.	Filed.
Aliens with firearms . . . .	\$1,160	\$5	30	1	29	-	6
Assault on officer . . . .	25	-	2	1	1	-	-
Interfering with officer . . . .	10	-	1	-	1	-	-
<i>Birds.</i>							
Protected at all times . . . .	251	-	22	1	21	1	1
Taking eggs from nest . . . .	70	-	3	-	3	-	-
Quail, close season . . . .	10	-	1	-	1	-	-
Partridge, close season . . . .	20	-	2	1	1	-	-
Pheasants, close season . . . .	60	-	5	-	5	1	-
Waterfowl, close season . . . .	140	-	10	-	10	-	3
Snaring birds . . . .	120	-	4	-	4	-	-
Sale of game birds . . . .	-	-	1	-	1	-	1
<i>Game.</i>							
Deer, close season . . . .	275	24	15	5	10	-	5
Using rifle during deer week . .	25	-	1	-	1	-	-
Rabbits, close season . . . .	5	-	1	-	1	-	-
Rabbits, ferreting . . . .	35	15	10	3	7	-	4
Rabbits, removing from hole . .	10	-	3	-	3	-	2

*Classified Court Cases, 1921 — Continued.*

VIOLATIONS.	Fines imposed.	Costs imposed.	Number of Cases.	DISPOSITION.			
				Discharged.	Convicted.	Appealed.	Filed.
<i>Game — Con.</i>							
Rabbits, exceeding bag limit . . .	\$10	-	2	-	2	-	-
Squirrels, close season . . .	45	-	5	-	5	-	2
Raccoons, close season . . .	20	-	1	-	1	-	-
Skunks, close season . . .	10	-	2	1	1	-	-
Muskrats, close season . . .	10	-	2	-	2	-	1
<i>General (Game).</i>							
Hunting without license . . .	573	\$15	60	5	55	-	11
Hunting on posted land . . .	27	-	6	1	5	1	2
Hunting on reservations . . .	50	-	11	1	10	-	3
Hunting on Lord's Day . . .	410	-	61	4	57	1	18
Hunting license, transferring . . .	10	-	1	-	1	-	-
Hunting license, securing by false statements.	115	-	7	-	7	1	-
Hunting license, refusing to show . . .	10	-	1	-	1	-	-
Trapping, name not on trap . . .	40	-	9	-	9	-	5
Trapping, without permit . . .	15	-	4	-	4	-	2
Trapping, illegal traps . . .	30	-	3	-	3	-	-
Trapping, with scented bait . . .	-	-	1	-	1	-	1
Carrying firearms without permit . . .	100	-	1	-	1	-	-
<i>Fish.</i>							
Bass, close season . . .	5	-	3	-	3	-	1
Bass, short . . .	40	-	5	-	5	-	-
White perch, short . . .	132	-	6	2	4	-	-
Yellow perch, bag limit exceeded . . .	45	-	3	-	3	-	-
Trout, close season . . .	20	-	3	-	3	-	-
Trout, short . . .	86	-	10	-	10	-	-
Pickereel, close season . . .	10	-	2	-	2	-	1
Pickereel, short . . .	28	-	9	-	9	-	2
Herring, taking without a permit . . .	15	-	1	-	1	-	-
<i>Lobsters.</i>							
Lobsters, short . . .	829	-	19	2	17	2	-
Interfering with traps . . .	-	-	2	-	2	-	2
Not marking car . . .	45	-	4	-	4	-	1

*Classified Court Cases, 1921 — Concluded.*

VIOLATIONS.	Fines imposed.	Costs imposed.	Number of Cases.	DISPOSITION.			
				Discharged.	Convicted.	Appealed.	Filed.
<i>Lobsters — Con.</i>							
Fishing without license . . . .	\$95	-	15	-	15	-	6
Fishing outside of own county . .	-	-	2	-	2	-	2
Buoys not branded . . . . .	-	-	20	-	20	-	20
<i>General (Fish).</i>							
Mackerel, underweight . . . .	100	-	4	-	4	-	-
Smelt, close season . . . . .	97	-	3	-	3	-	-
Scallops, close season . . . . .	60	-	4	-	4	-	-
Larceny of fish . . . . .	-	-	3	-	3	-	-
Fishing in fresh water other than by hook and line.	50	-	6	1	5	-	-
Seining in fresh water . . . . .	15	-	3	-	3	-	-
Fishing without license . . . .	638	\$20	101	3	98	-	20
Torching in salt water . . . . .	150	-	3	-	3	-	-
Using more than ten hooks . . .	80	-	4	-	4	1	-
Total . . . . .	\$6,231	\$79	523	32	491	8	123

The large number of cases may be attributed to the greater time the wardens were able to spend in the field and the large number of people out of employment, who thus had leisure to roam the woods and turn to the natural food supply of fish and game, as did their forefathers in times gone by. However, in few cases were the violations committed through sheer need of food. Fish and game laws being for the good of all, must be observed by all accordingly.

It is difficult to single out the work of one warden as surpassing that of another, but some of the more important cases are sketched briefly.

On December 1 Warden Tribou, assisted by Warden Leonard and unpaid warden Cranton, apprehended John Imhof, Charles P. Willey and Charles F. Scotton, all of Bridgewater, for illegally killing deer. Each was fined \$50 by Judge Charles C.



King in the Brockton court. For carrying a rifle while hunting deer, Roger Sweet of Pittsfield paid a fine of \$25 in the court of Judge Bart Bossidy of Lee, on complaint of Warden Sargood on December 20.

Intent on cleaning out the source of many violations and complaints in the past, Warden Peck visited Waquoit on February 5, and arrested Freeman and Thornton Adams and Donald Coffin for killing ducks in close season. They were fined \$20 each by Judge Frederick Swift of Barnstable. Since then fewer complaints have come from that section. This matter was also reported to the Federal authorities for their action.

The pernicious practice of ferreting rabbits cost Thomas J. Lyons of Pittsfield \$10 when Wardens Ziegler and Sargood haled him before Judge C. L. Hibbard at Pittsfield on January 12.

William Tracy of Westfield "took a chance" on killing a deer on February 17, but Wardens Monahan, McCarthy and Hatch were at hand, and it cost him \$50 to learn from Judge W. S. Kellogg of Westfield the laws regarding deer. Frank O'Laksak of the same town paid \$35 for hunting without a license, and another \$25 for furnishing Tracy with transportation for his illegal act.

Wardens Steele and Ellis apprehended Alphonso Petzi at Weymouth with dead ducks on February 8, and he was fined \$20 by Judge Albert E. Avery at Quincy, after stating that he killed the birds with snowballs. Frank Petzi paid the same fine for the same offence, even though he resorted to the old-fashioned method of using a gun.

Solomon and Henry Rosenblum of Worcester were apprehended on June 28, by Wardens Macker and Snell, each with ten short white perch, and were penalized \$52 apiece by Judge Wm. E. Fowler of Westborough, from which finding they appealed.

On August 28 George F. Pearson of Lowell was apprehended by Warden Backus at Littleton with 17 short pickerel, and was fined \$17 by Judge Warren A. Atwood at Ayer. On September 3, contrary to law, he secured another license in Lowell and commenced fishing again, but his sport in defiance of the law

was short-lived, for on September 17 Warden Crosby apprehended him at North Chelmsford, and his indiscretion cost him \$10, together with the loss of his license again.

Judge Sumner D. York of Gloucester fined Charles E. Norwood of that city \$25 for killing a pheasant during close season, and \$25 more for making false statements to secure a license. Warden Grant brought this man before the bar.

On September 28 Joseph Divard of North Dana was arrested by Warden Shea for having two raccoons during the close season, and he was fined \$20 by Judge H. C. Davis of Ware. It appeared in the course of the trial that this man had been driven out of the State of Connecticut for infractions of the game laws.

Warden Babson of Gloucester, together with city police officers, arrested Nero Caradona, Jack Caruso, John Destinn and Sam Sheranetero in Gloucester Harbor on August 30 for seining spike mackerel, and Judge York fined them \$25 each.

The pernicious habit of snaring song and game birds still prevails among aliens. On October 14 Warden Charles E. Tribou, assisted by Warden Leonard, found a 40 by 7 foot net in the woods at West Bridgewater, and Frank Teboni of that town paid \$25 for the offence. The same officers, after a long vigil, apprehended Samuel Sanlen of Brockton while he was setting and tending snares near Brockton. He was fined \$25 for the offence by Judge King of Brockton, and \$20 for hunting without a license. This man led the wardens over a mile course before they laid hands on him. Edward Dallo of Huntington tried the same thing, but his snaring activities cost him \$20 on complaint of Wardens Monahan, Hatch and McCarthy.

Late in October Warden Goodwin apprehended Pasquale Scalero of Boston who was snaring in Lincoln. He had in his possession 29 dead song birds and 4 live birds, which were used as decoys, together with two 25-foot nets and a gun. Judge Prescott Keyes of Concord taxed him \$140, and confiscated all his illegal gear.

On October 20 Warden Mecarta, assisted by unpaid Warden H. R. Cahoon, arrested Robert B. Nash, Richmond T. Nash, George H. Bicknell and Wallace H. Bicknell, all of Weymouth, in a camp at Barnstable while they were gunning on Sunday.

It cost them \$10 each. Their companions, Charles B. Reilly and Charles S. Bicknell, were discharged as having taken no part in the illegal work.

#### LOBSTER LAWS.

It appears that the lobster laws are being well observed along our shores at the present time. Only one lobster license was revoked this year because of a second conviction, — that of Robert Cushman of Duxbury, apprehended by Wardens Tribou and Leonard on September 5 for having short lobsters. This speaks well for the lobster fishermen.

Chapter 116, enacted this year, restores to certain of the aliens who have fished for the past five years the right to obtain a license. That right had been denied them under a law passed in 1920.

Among the more interesting lobster cases may be mentioned that of Arthur R. Cornell of Westport, who was surprised by Wardens Lowe and Peck just as he was about to supply the members of a well-known lodge with 145 short lobsters. Judge Frank A. Milliken of New Bedford fined him \$100.

Frank Gove of Nahant was found by Wardens Burney and Goodwin with 35 short lobsters, and after trial before Judge Southwick of Nahant he paid \$52 on September 29. On September 6 the same officers haled Thomas Hogan of Salem before Judge George B. Sears of Salem, by whom he was fined \$51 for seventeen "shorts." Forty-five undersized lobsters cost Herman L. Marchant of Gloucester \$94, and 40 of the little fellows cost Fred W. Riley of the same city \$74, when Warden Grant and unpaid wardens Sargent and Thurston summonsed them before Judge York, sitting at Gloucester.

After a lively struggle Warden Peck arrested Walter E. Nickerson on July 16 with short lobsters, and he was fined \$50, while Robert L. Newton of Marshfield, on complaint of Wardens Steele and Ellis, was fined \$156 by Judge Harry B. Davis at Plymouth, with an additional \$10 for not marking his car. The same officers found A. H. Taylor of Marshfield with 19 shorts, and he paid \$57.

On complaints received early in the season, that illegal lobster fishing was going on in Cuttyhunk waters, Warden Seaman,



assisted by Wardens Macker, Steele and Ellis, visited that locality and arrested six men for fishing without licenses. Since that time no complaints have been received on this score.

During March, April and May a dozen wardens, under direction of Warden Goodwin, inspected the lobster shipments which come to Boston twice weekly from Nova Scotia and the Maritime Provinces. In the course of these inspections they seized and liberated at different points along the shore some 22,000 short lobsters. This is undoubtedly one of our most important activities with reference to the lobster industry, resulting, as it does, in heavily stocking our waters each year.

#### LICENSE LAWS.

During the past year 87 resident combination licenses and 14 resident fishing licenses were revoked after conviction of the holders in court. Taking into consideration the large number of licenses issued yearly, the proportion of violations to the number of hunters is not so great as might be imagined.

Only one alien license (fishing) was revoked, but 30 unnaturalized, foreign-born persons were charged before the courts with having firearms in their possession. In each case the weapon was confiscated. The year's accumulation was disposed of in one lot for \$75, indicating that it is only the very cheap guns which the aliens buy and hunt with. The number of cases is not large, considering that our foreign population is substantial, and that these people have a natural longing, in common with our citizen gunners, to go afield with dog and gun. But on this point we adhere to our position, stated in previous reports, that the privilege of exploiting the natural resources of the State should be denied to aliens who are unwilling to assume the obligations of citizenship.

There were 60 persons who "took a chance" on hunting without a license, while 101 went fishing in stocked waters without first having registered. While last year the Division was lenient in enforcing the new law, at this date the fishing license requirements are well known, and violations are being rigidly prosecuted.

During the year we accepted the surrender of three licenses held by minors under eighteen who had broken the laws, on



their agreement to refrain from hunting or fishing for a year. This was deemed a better policy than to give these young men a court record early in their career.

#### FEDERAL REGULATIONS.

Our wardens have been alert to detect violations of the Federal regulations relative to migratory birds, and on several occasions, particularly at the opening of the shore bird season, they have worked in conjunction with the United States Game Warden for this district, Mr. Albert E. Stadlmeir of Providence, R. I. While all the State wardens are duly appointed Federal wardens, their duties end when they have reported to the authorities in Washington any violations which come under their observation. All prosecutions for violations of the Federal laws are entered in court through the United States Solicitor-General's office, on order of the authorities in Washington, and not by the wardens. This co-operation between the Federal and the State forces has resulted in increased protection for the migratory birds. In enforcing the State law on the migratory species one of the most perplexing problems is the apparent inability on the part of many shore-bird and wild-fowl gunners to distinguish the different species, with the result that annually a certain number of protected birds are killed. There is always, too, the latent possibility of killing protected species unwittingly, for it is not unusual to find such in the flocks of birds which may legally be killed. The policy of the division is to be very cautious in accepting such explanations as excuse for the killing of protected species, and those who hunt would be wise to familiarize themselves with the different species and to use great care when shooting.

#### REVISED LAWS.

For the first time in four years, during which period the Joint Special Committee on the Consolidating and Arranging the General Laws was recodifying the statutes, we were able to publish booklets giving the complete text of the laws relative to fisheries and game.

## LEGISLATION.

The sixteen new laws relative to fish and game enacted by the General Court of 1921 were, briefly:—

Chapter 24, empowering local authorities to grant permits for construction of weirs, pound nets or fish traps in tidewater anywhere within their town jurisdiction.

Chapter 25, regulating beam trawling in Menemsha Pond.

Chapter 55, authorizing the Director of Fisheries and Game to issue permits to any responsible person to destroy vermin within reservations established under chapter 131, General Laws, Sections 69 to 75.

Chapter 58, permitting capture of eels in Hingham Harbor, laws to the contrary notwithstanding.

Chapter 75, removing age limit with respect to ornithological permits.

Chapter 90, prohibiting liberation of sick or diseased birds or quadrupeds, and requiring approval of Director of Fisheries and Game for liberation of any propagated stock (other than live decoys).

Chapter 107, empowering the Governor to extend the open season on pheasants, partridge, woodcock, quail and squirrels for a period equivalent to the time he may have suspended the open season on account of drouth.

Chapter 116, making it possible for certain aliens to secure lobster-fishing licenses.

Chapter 121, correcting an error in the muskrat law, legalizing capture by trap only from March 1 to April 10, and eliminating spring shooting of muskrats.

Chapter 152, making special seasons on hares and rabbits in Dukes and Nantucket counties.

Chapter 159, permitting sale, under license, of European or gray partridge.

Chapter 188, establishing catch limits on bass, pickerel, horned pout, yellow perch and wall-eyed pike, and restricting sale of same.

Chapter 197, lengthening the closed season on bass and increasing the legal length.

Chapter 224, increasing legal length of pickerel and regulating capture, possession and sale.

Chapter 257, providing reimbursements by the commonwealth for damage caused by wild moose.

Chapter 467, providing for increased fees for hunting and fishing licenses, and including women in the operation of the license law.

The recommendations made to the Legislature of 1922 for changes in the fish and game laws will be found in the Appendix.

## BIOLOGICAL DEPARTMENT.

### GENERAL.

The year's activities were divided between research work confined to the laboratory and libraries, and a limited amount of field work having to do principally with the study of fish disease in connection with the problems at the East Sandwich and the Palmer fish hatcheries, and the surveying and biological study of the fishways.

### PERSONNEL.

Mr. Leslie J. Gilbride, who resigned on September 15, has been succeeded by Miss Gwendolyn Perkins.

### REPORTS.

Papers upon fish investigations are available for publication but lack of funds has rendered this impossible during the present year.

### SURVEY OF INLAND WATERS.

During the year some consideration was given to the availability of streams for the propagation of brown trout, requiring additional surveys of the Westfield River, the Konkapot River, the Ware River and the Manhan River near Easthampton. A preliminary investigation was made on the status of Newton Pond, Shrewsbury. There are a number of ponds throughout the Commonwealth, the exact size, and therefore the exact status of which, remains in question (jurisdiction as to fishing being held in only those containing 20 acres in their natural state). It is our purpose from time to time to determine our jurisdiction over waters concerning which there is question. Such cases, for example, were Crooked Pond, Falmouth, and Coy's Pond, Wenham, surveys of which were made, at the request of this Division, by the Division of Waterways and Public Lands. By these surveys their status as great ponds was established.



## SMELT.

Owing to the lack of funds to provide a sufficient field force, no further studies were made on the spawning habits or artificial propagation of the smelt, excepting such work as was done at the field station at Hingham, discussed under "Inland Fisheries."

## ALEWIFE.

Work on the alewife was confined to advising and assisting in the transportation of adult alewives from certain streams to old and new breeding grounds. (See "Alewives" in the section on "Marine Fisheries.")

## BIRD DISEASES.

No problems of bird disease were brought to our attention except such as resulted from contact by the birds with oil waste on the waters. This problem is discussed under "Destructive Agencies" in the section on "Wild Birds and Animals."

Two of the swans, mentioned elsewhere as having been killed at our orders because tarry oil waste had so matted their feathers that they could not lead a normal existence, were received for autopsy. The findings, negative as regards disease, showed a poorly nourished condition, evidently due to the inability of the birds to obtain sufficient nourishment. The plumage, particularly on the underside of the body, was covered with a dark, tarry, adhesive material, which bound the feathers together in mass, not only causing an unsightly appearance, but preventing the bird from preening itself, and depriving it of its ability to maintain its body temperature through feather protection. Although unusual, a similar case has been reported during the past in England, where swans were covered with an oily trade waste and permanently disabled.

While much of the disappearance of ruffed grouse has been generally attributed to disease, our limited field force has made it impracticable for us to carry on any studies by which to prove or disprove this theory.



## FISH DISEASE.

Further studies were made in fish septicæmia, commonly called *Furunculosis*, which became an epidemic at the East Sandwich hatchery in 1920, when its study was first undertaken. This disease has been isolated from wild fish (pickerel), in one of the inland lakes of the Commonwealth, and is not confined, as originally believed, to fish under artificial conditions as in hatcheries. Improved methods of rapid diagnosis have enabled us to quickly bring the disease under control, with prospects of completely eliminating it at an early date in the hatchery where it has appeared. A general review of all fish diseases has been made, and the salient facts of the various investigations (mostly in foreign countries) relative to fish diseases have been condensed into form available for ready use. This has necessitated much reading and bibliographic research.

## POLLUTION.

Observations were made on the conditions in the Merrimack River, not for the purpose of isolating and analyzing the different types of pollution, but rather to determine whether any fish would frequent these waters in their present state of defilement, and to observe something of the fish life in the river. As stated elsewhere, the belief has been general that the condition of this river was such that no migratory fish would frequent it. This has proven to be erroneous by the presence of alewives in the fishway at Lawrence during the past spring.

An investigation of conditions in the Aberjona River was also begun.

Further report on pollution appears in the section on that subject under "Inland Fisheries."

## WILD BIRDS AND ANIMALS.

### WINTER FEEDING.

There was little occasion for feeding the stock in the wild, for the winter of 1920-21 was an open one, with little snow or cold weather until the end of December, 1920. Though there was a foot of snow in the Berkshire Hills during the deer season (Dec. 6 to 11, 1920) there was no State-wide snowfall until December 27, and the first real storm of the winter (about 16 inches, pretty general over the State) did not come until Feb. 20, 1921. A severe northeast gale drifted the snow badly, but, being very light and dry, the effect on the wild stock was not more serious than to temporarily cut off the food supply. The remainder of the winter was favorable for the wild stock. A limited amount of scratch feed (223 allotments, totaling 2,000 pounds) was sent to volunteer workers to be available in case of emergency. Cost of feed and express, \$245.59.

The public has been instructed that our purpose is not to supply food to the birds in the winter except when the stock is *in extremis*. They have been cautioned not to use the feed on any other occasion.

### FIRES.

Forest fires, especially those in the spring, have a direct bearing on the natural increase of birds and game by killing the helpless young and destroying nesting sites. In these days of better fire control this danger is minimized. Nevertheless, considerably more land was burned over this year than last, according to the figures of the State Fire Warden.

Last year during the open season the excessive dryness of the vegetation and the large number of fires made it necessary to suspend the open season. As the gunning season approached this year conditions more or less paralleled those of last year. The covers were very dry, but, with the belief that the public was sufficiently well informed of the dangers and the precautions necessary, His Excellency permitted the season to open, after having pointed out the dangers in a forcefully worded

warning on the subject. Subsequent developments justified his action, for but few fires occurred during the period from October 20 to 25, after which rainfalls removed the menace to a very great degree.

#### POSTED LAND.

Little can be added to what has been said in previous years on this subject. Far too large a portion of the hunting area of the State is closed, in sheer self-defence, by the owners, who have suffered inconvenience and money loss through the careless use of their property by gunners. We have for years preached the doctrine of respect for the rights of landowners, and last year recommended a law penalizing any person who, in the act of hunting, trapping or fishing, wilfully destroys or injures the property of another. Our recommendation was referred to the next annual session.

Two of the gunning clubs working with the landowners, posted their localities with signs which are worth quoting:—

## ATTENTION SPORTSMEN

Please use care as to  
**FENCES and FIRES**  
as you are allowed on these premises  
through kindness of the owner.

**EASTHAMPTON FISH AND GAME ASSOCIATION.**

## SPORTSMEN

### Privilege to Fish or Hunt DEPENDS ON YOU

1. Respect the rights of the owner of this property. He is a good fellow, or it would be posted.
2. Make good any damage you do, and report that done by others. You may want to come again.
3. Don't throw away a lighted match, cigar or cigarette. Aid in fire prevention.
4. Obey and assist in enforcement of fish and game laws of the Commonwealth. Notify nearest game warden of violations.
5. There are two kinds of sportsmen — the regular guy and the piker. Where do you fit? It is a decided compliment to be known in your community as a clean sportsman. Wear your membership button with credit to yourself and your club.

#### THE PENALTY

Increasing annual loss of open fishing and hunting in the Commonwealth largely due to the MISCONDUCT of the PIKER.

#### FIFTY-FIFTY

The farmer supplies the streams and covers. You are taking from both. What are you giving him in return? Join a Rod and Gun Club and assist in restocking his streams and covers.

#### PAPER CITY ROD AND GUN CLUB

Holyoke, Mass., M. A. MacDowell, Secy.



## BREEDING SEASON.

The weather in the early months of 1921 was unseasonable and erratic. Spring temperatures prevailed in March and warm weather in early April, which started vegetation before its normal time. Following this warm period came cold winds and low temperatures, and the local frosts which occurred from time to time checked the prematurely started vegetation. Sharp drops in temperature were common. Nevertheless, when the breeding period of the game birds was actually under way, weather conditions, with a few local exceptions, were all that could be desired. The season can be characterized as excellent, with good broods of strong birds. Naturally, in those sections where the brood stocks are badly depleted, the production at best would be numerically small. Heavy rains and flooded conditions during the last days of June undoubtedly destroyed some of the young. The mild temperatures in the early months had the effect of somewhat hastening the breeding season to about two weeks ahead of the usual time.

## MIGRATORY BIRDS.

*Song and Insectivorous Birds.*

Permits were issued to 74 individuals for the collection of birds, eggs and nests for scientific purposes. Sixty-seven reports on these permits were made; 415 birds were reported as collected, and 438 eggs; average number of birds taken per person, based on number or reports, 6+; average number of eggs taken per person, 6+.

Apart from regulation of collectors' activities and the enforcement of the protective laws, our greatest contribution to the welfare of these species, which add so greatly to the attractiveness of the outdoors in addition to their incalculable service in the control of noxious insects, is our co-operation with the Audubon Society in the maintenance of the Moose Hill Sanctuary, described in another part of the report. Similarly, all reservations controlled by the Department of Conservation serve as sanctuaries.

We have had under investigation the matter of bringing back the purple martin. Considerable data have been collected,

in the hope that eventually this beautiful as well as valuable insectivorous bird may be restored to the numbers which prevailed prior to the disastrous storms in the breeding seasons of 1903 and 1904.

### *Migratory Game Birds.*

*Shore Birds.*—The spring migration covered the usual period, though some species started a little early. As is indicated elsewhere, some species were fewer in number and some greater, while the total flight indicated an improvement in the numbers. The summer and fall flight was usual, with an appreciable increase in the number of the smaller species. During the first two or three days there was good shooting on the birds for which an open season is provided. This condition seems to be an annual feature. The birds come along slowly and collect in substantial numbers in the most favorable localities, so that by the time the season opens, on the 16th of August, good shooting is assured for a day or two. Then usually follows a week or ten days with very few birds in flight, and from then on they keep a more or less irregular movement.

*Black-breasted Plover.*—The spring migration was light, fewer birds being observed on the usual range. On some portions of the north shore, noticeably in and around Ipswich, a slightly greater number of birds than usual was reported. The summer and fall migration brought a light flight of birds. On the opening day of the shooting season, August 16, very few were taken along the entire coast. Through the following weeks there were no conditions to bring a sizeable flight, the birds moving along in small numbers. It is hoped that succeeding years will work favorable changes in the numbers of these handsome birds; otherwise serious consideration will have to be given to a closed season.

*Golden Plover.*—Golden plover were noted in a number of localities, but only a comparatively few birds. So few people are familiar with the characteristics of this bird which distinguish it from the black-breasted plover that it is difficult to obtain an insight to the true situation. The significant thing is, that not enough have appeared to make the fact noteworthy,

and the only reasonable inference is that if the birds are increasing it is at a very slow rate.

*Upland Plover.* — The upland plover still exists on a restricted range. Within that range during the past year there was some slight increase. Eight birds in one flock were observed on the south side of Marthas Vineyard. It is always dangerous to attempt to estimate the number of birds on a given range by using as a basis the numbers found in most favorable localities for as long as there are any birds of a given species left, some will always be found in such a region. The upland plover is apt to be found in scattering numbers throughout the State over many years, but it is not likely that it will ever increase in such numbers as to be called plentiful.

*Killdeer Plover.* — The killdeer plover was reported in more localities than common. More interest than usual was shown in the bird because of its interesting personality, its lively ways, and wider distribution. It was reported in a number of localities on Cape Cod, on the North Shore and inland. Two pairs were reported as breeding within the limits of Belmont. The reports on the fall movement indicated a more liberal sprinkling of the birds over the eastern part of the State as compared with previous years.

*Piping Plover.* — Piping plover seems to be slightly on the increase. It is a bird unfamiliar to many for the reason that it inhabits the bolder shores. Few of the shore birds have more interesting mating antics or are more attractive and beautiful in the breeding season, and any observer would be well repaid for special efforts to follow them in the spring. The migration was usual.

*Jack, or Wilson's, Snipe.* — The spring migration was normal; the fall flight heavier than usual. The Jack snipe is becoming more in favor as a game bird, no doubt because of a noticeable increase in numbers. This bird has shown greater gain than any other species.

*Woodcock.* — The spring migration was a little earlier than usual, with a heavier flight of birds. The fall flight, while not characterized by arrivals of large numbers of birds in short spaces of time, as occasionally happens, was marked by a rather steady migration. Every year a great deal of dissatisfaction



is expressed, for the reason that most of our native woodcock migrate before the season opens. In recent years an exceptionally dry period at the beginning of the shooting season has induced the native birds to move on, and afforded little attraction to the advance guard to the flight. But all through the season of 1921 woodcock were found over the entire State and afforded a great deal of good sport. The flight along the shore and in the Cape Cod region was heavier than for a number of years.

*Dowitcher.* — There is not a sufficient number of dowitchers appearing in the annual flight every spring or fall to make a satisfactory comparison from year to year. They came mingled with other shore birds, and a fair conclusion, based on the number of reports, is that the birds were noted more times both in the spring and fall flights than during the past two or three years.

*Sandpipers.* — The spotted sandpipers are well distributed over the State and enjoyed a good breeding season. They arrived and departed at about the usual time.

*Least Sandpiper and Semipalmated Sandpiper.* — The number of birds returning on the fall flight was heavier than usual.

*Yellowlegs.* — Both the summer and the winter yellowlegs made an early spring migration, with the winter yellowlegs supplying the heavier proportion. The fall flight of summer yellowlegs appeared about the usual time, affording very good shooting on the opening day, August 16. Comparatively few were taken during the following week or ten days, but thereafter additional birds appeared, supplying fair sport until the flight was over. There was a scattering of winter yellowlegs present on the opening day, but the heavier flights occurred later in the season, a little heavier than usual toward its close.

*Willet.* — Very few willet were reported, which would seem to support our earlier forecast that the bird is having great difficulty in holding its own.

*Hudsonian Curlew.* — The favorable report of last year was bettered this year, for more Hudsonian curlew were noted along the shore than has been the case for a number of years. Whether the slightly larger numbers noted last year and this year indicate a gradual increase in the species is difficult to



say. But it is heartening to observe an increased number of these larger shore birds.

*Godwit.* — Comments on the godwit would parallel those of the dowitcher. While the bird has been noted in flights of shore birds, it has not increased sufficiently to make its numbers significant in any flight.

*Water Fowl.* — The wild fowl and shore birds have considerable in common with respect to the conditions affecting the seasons of migration; that is to say, an early season for one group generally means an early seasonal movement by all groups. As time goes on certain elementary principles are being more and more demonstrated. Such a one, for example, is that the wild fowl will stay in localities where there is sufficient food and absence of persistent disturbance, even though other conditions may not be so favorable as could be found in other localities. Our coast and marsh area continues to be occupied by increasing numbers of wild fowl as a wintering zone. For example, more bluebills, red-heads and geese stayed with us during the past winter than has been the case for a number of years. It is also fair to assume that there is a substantial number of birds which will make the minimum rather than the maximum migration. With the removal of spring shooting there has been a noticeable addition to the number of birds breeding in the State, which may easily be accounted for by the foregoing proposition.

*Wood Duck.* — The wood duck is slowly on the increase in the areas still remaining in the State suitable for it. What has been said as to breeding grounds of such birds as the rail can well be said of the wood duck. But the future of any such species in a State like ours cannot be regarded as favorable, unless steps are taken to insure the maintenance of suitable breeding grounds. However, the fact that this duck is increasing generally throughout the United States argues that the species will be represented here for years to come.

*Mallard Duck.* — Some little evidence still remains of the efforts to propagate this species, for small flocks have been reported here and there, together with a few of the wild birds which came this way on their migration. But the mallard, along with certain other odd species, such as the pin-tail and

teal, are a very small factor as a sporting proposition in this State.

*Red-head.* — The red-heads made their appearance very early in the year, and continued to come up to the early part of March. The spring flight was a little heavier than usual in the localities where the red-heads come. During the fall flight but few birds came into the State as compared with the much heavier flights of recent years. It is perplexing to know just what is taking place with reference to the red-heads. It may be failure of food or other unfavorable conditions of which we have no definite knowledge, or it may be due to a reduction of the number of birds in other parts of their range; but the fact remains that the number of red-heads frequenting the State in the fall is on the decrease.

*Canvasback.* — The canvasback is practically in the class with the mallard, pintail and teal. A few are taken each year, but it is not a substantial factor as a sporting proposition.

*Black Duck.* — The black duck continues its good record. More birds appeared in the State this spring than for many years. The breeding season was a favorable one, resulting in a large hatch. The fall flight of the "red legs" was very substantial. If the Migratory Bird Treaty Act regulations were valuable in no other respect, they have certainly increased the number of black ducks. But along this line it is fair to state that the sportsmen of New England, under existing regulations, work at a very great disadvantage. The regulations prohibit the shooting of ducks after sunset. It is a well-known fact that the black duck is a nocturnal feeder. During the day he lies out in the salt water or in the centers of the larger ponds, and does not come to the feeding grounds (except in very heavy weather) before sundown. And during the period from sunset to an hour thereafter only the advance guard of the ducks are apt to come to the feeding grounds, the larger portion arriving later. In view of the increase in the species, we believe that some consideration should be given to gradually relaxing the regulations to the extent of providing some reasonable opportunity for the sportsmen of the State to take a few birds shortly after sundown.

*Bluebill.* — The spring flight of bluebills was heavy. To some extent it is difficult to state when the so-called flight starts, for the reason that large numbers of bluebills winter in Marthas Vineyard and Nantucket sounds and the adjoining brackish and fresh-water ponds. The number which wintered this season was greater than has been noted for many years. The fall flight started early and was heavier than for a considerable time. The bluebill is a very interesting little duck, and in addition to its fine sporting qualities, is excellent eating. It is a great satisfaction to be able to report so favorably on a species.

*Scoter.* — The spring flight was about normal, while the return flight brought a larger number of birds than usual.

*Sheldrake.* — The sheldrake is undoubtedly on the increase. Breeding as they do on the inland water courses, the conditions seem to have been very favorable during the past year on their natural breeding ground in the North, for somewhat more than normal numbers were observed on the fall flight.

*Whistler.* — The spring migration of whistlers was substantial, and the birds came along at about the usual time. Whistlers arrived later in the fall than usual, and during the open season and up to the close of this report but very few had appeared.

*Widgeon.* — The range of the widgeon in this State is quite limited. Straggling birds and small flocks are from time to time noted in various localities, but they frequent mostly the easterly end of Marthas Vineyard. The Squibnocket and Pocha ponds harbor a very large percentage of the widgeon coming to these shores. There is an abundance of widgeon grass in both of these ponds, which provides an attractive food supply. There are times when the widgeon grass seems to die out, with the result that the birds pass along quite quickly. The widgeon is a very spry, gamy bird, and is one of the most edible of ducks. It is to be regretted that large numbers of them are not more broadly distributed over the State.

*Geese.* — The flight from Dec. 1, 1920, up to the close of the season, to wit, Dec. 31 of the same year, continued to be very heavy, with the result that during the whole fall flight more



geese were killed in the State than has been the case for many years. During the remaining portion of the winter and the following spring (1921) large numbers of geese wintered in the waters adjacent to Nantucket and Vineyard sounds. As in the case with red-heads and bluebills, it is difficult to judge when the spring migration actually started; but it continued until well into the spring. The flight was steady and heavy. The fall migration up to Nov. 30, 1921 (to which date this report is made), justified the hopes raised by the heavy spring flight. The return movement began reasonably early and brought even a greater number of geese than was observed in the preceding season. All of this has resulted in unusually good sport. Whether the increase is due to restrictive measures or to a more favorable breeding season, or to any possible shifting in the flights of birds, it is perhaps a little too early to venture an opinion, but the fact remains that the number of geese on our shores is very substantially on the increase.

The spring and fall flight of brant, while not exactly paralleling that of the geese, has, nevertheless, indicated that a gradual increase is taking place.

*Statistics of the Gunning Stands.* — The figures for 1920 and 1921 are of interest as revealing the unusual number of geese taken at the stands on the heavy flights which marked these seasons.

The figures following represent the totals of the number of stands from which it was possible to secure a report, as indicated: —

OPEN SEASON OF —	Number of Stands listed.	Number of Stands which reported.	Geese shot.	Ducks shot.	Live Goose Decoys.	Wooden Goose Decoys.	Live Duck Decoys.	Wooden Duck Decoys.
1917 . . .	67	51	726	3,495	1,793		2,093	
1918 . . .	53	52	2,065	5,349	2,452		2,112	
1919 . . .	74	74	2,458	8,322	2,548	1,914	2,492	2,641
1920 . . .	61	61	5,333	8,441	2,194	1,797	2,320	2,226
1921 . . .	128	115	8,438	16,641	3,354	3,471	4,540	3,499

*Swan.* — Only an occasional swan has been reported.



*Migratory Non-Game Birds — Gulls and Terns.*

In spite of warden service at the large colonies at Chatham, Monomoy and Nauset, and notwithstanding favorable weather conditions during the breeding season, a rather large proportion of the year's hatch failed to reach maturity. The Nauset colony (on an island and free from vermin and from visitors) was an exception. These birds brought off a large hatch, with almost no mortality.

The gulls and terns once more present a problem. Some years ago, through commercial exploitation, they faced extinction. Accorded a perpetual close season they gradually increased, and several large breeding colonies and innumerable smaller ones had established themselves along the coast. To all appearances the future of the gulls and terns in Massachusetts was assured. But conditions are now operating which again threaten destruction unless means can be found to avert it. This danger is the lack of undisturbed nesting sites. The ideal breeding place is one which is isolated and free from human visitors or predatory animals. Time was when our shores afforded some such locations. Now hardly a part of our coast can be found that is not built up with summer residences and overrun with vacationists, either resident or on a day's outing, and the birds' haunts are constantly invaded. We can warn these persons, through posters or through caretakers, that the eggs and birds must not be disturbed, and they may conscientiously refrain from so doing. But the mere presence of a person on the breeding grounds while the young are in the nests may still result in a large mortality. Left undisturbed, the parents remain on the nests and shelter the fledglings. But should the adult birds be frightened from the nests, the young are left exposed to cold, dampness or (during a heavy wind) to drifting sand which may bury and smother the unprotected young. Exposure even for a short time may mean a heavy loss.

With the influx of summer residents the army of abandoned cats and their progeny is constantly augmented. These cats, together with skunks and rats, invade the breeding grounds and work havoc among the eggs and birds. Vermin has be-

come so numerous, as to be causing the birds to abandon long-established breeding locations. Already the north beach at Chatham, where formerly a large colony existed, is deserted. Though a few birds tried to nest there this year, the young were entirely destroyed. A raid of cats at the Monomoy colony was responsible for the loss of a portion of the hatch, and in the course of events this colony may be broken up unless the vermin can be kept out. When the birds are forced to abandon a location, they break up and nest in small, scattered groups, but they fail to find locations free from summer residents or predatory animals, and few of their young under such conditions reach maturity.

All these conditions are difficult to combat, except by heavy expenditures. Even though some colonies have had caretakers, they are only part-time men, not residing on the breeding grounds, and unable to be constantly on guard, and the lesser colonies, being small and scattered, would require many wardens. To clear the larger breeding grounds of vermin would probably be the most effective measure within the scope of our resources.

In previous reports we have referred to the baffling problem presented by the lingering of wild fowl in this locality during very severe winters until so weakened that many die of starvation. In the tern colonies we are confronted with the problem of many birds building their nests so close to the water that high tides, especially if accompanied by a strong wind, will often completely flood and destroy the nests. It seems almost hopeless to protect a species when their instincts do not serve them better in such matters.

#### *Destructive Agencies.*

*Oil Waste.* — We commented last year on the new agency of destruction to migratory birds (as well as to the fisheries and shellfisheries) in the presence of oil or waste on the waters. A year has passed, and during this period conditions have become alarming for all of the wild life above mentioned. The dumping of oil from oil-burning vessels, the pumping out of lighters and barges used in the coastwise transportation of oil, gasoline, etc., and the refuse from refineries located on tide-

waters, have laid a mantle of destruction over vast areas of our coastal waters and lands.

The destruction to migratory waterfowl of all species has been alarming, but the most disheartening feature of all is that the actual destruction from this cause has only begun. Viewing the conditions as they are now with transportation activities at a minimum, it is fairly easy to foresee what will occur when business revives, unless there is an immediate check on the practice.

Early in the year it became necessary for us to order the killing of the flock of semiwild swans which had long frequented the Charles River at Watertown. The plumage of these birds, from contact with coal tar discharged into the river, had become so badly matted that unless humanely killed they would have perished of starvation and exposure. Autopsy findings are detailed in the section covering the "Biological Department."

A similar condition was reported among the smaller shore birds. Semipalmated sandpipers, ring-neck plovers, least sandpipers, and red-back sand pipers were noted in a crippled condition and limping about the flats at Jeffries Point, East Boston, where in feeding, their under parts had come in contact with the oil floating in the tide pools.

Large numbers of ducks have perished in the coastal waters of Massachusetts from this cause. The oil penetrates the feathers to the skin, exposing it to the water and the air, so that the proper body temperature cannot be maintained and death results. It is believed, also, that in some cases a cancerous condition develops. The birds seem to be powerless to combat the trouble, and when once touched by the oil it is only a question of time when they will die. It is possible that this waste may have some effect upon their food, but in all probability the damage is confined to the mechanical effect on the activities of the birds.

Numbers of dovkie, or little auks, were picked up along the shore in the vicinity of Sandwich, where they had struggled inland short distances from the sea. These birds were covered with the oil, the feathers being matted into lumps.

The mortality in other localities has been as great, or greater than in Massachusetts. Incidentally the oil has ruined, or is



rapidly ruining, many of the bathing places along the shore. It is working even into the more remote places, some of the waste being found, for instance, on the south side of Marthas Vineyard during the past summer. What has been said of it in relation to migratory birds could be urged with equal or even greater emphasis in relation to shellfish areas. When once deposited on these areas it is likely that the substance never can be removed. It means a permanent contraction of these valuable areas, which even now are comparatively small, considering the demands which will be made on them in the future.

Many remedies have been proposed. Federal legislation is now under consideration, and States have passed, or are considering passing, laws to abate the nuisance and remove the menace. The United States Biological Survey has under consideration, under the power delegated to it to protect migratory birds, the promulgation of a regulation to cover the case. It has been seriously considered in national conferences, as that which took place in Washington on June 16, 1921. On this occasion Secretary Hoover advised the States to take such action as they could individually, the same to be supplemented by conferences called, at his direction, by the representatives of the States having to deal with the problem. It is a favorable commentary that the people of the country have become alert to this condition in its early stages, and have been reasonably prompt in seeking remedies, but the essential thing now is speed, not only to preserve the birds, but to preserve certain valuable shellfish areas from being ruined beyond hope of reclamation.

*Lighthouses.* — The yearly reports of lighthouse keepers showed the fatalities at Massachusetts lights to have been as follows: —

For 1920: Long Point Light, Provincetown, 2 black duck, 2 devil divers, 3 gulls, 1 eider duck, 1 loon, 1 black-head gull; Marblehead Light, 1 duck; Minots Ledge, 1 small brown thrush, 2 small yellow-leg fly catchers; Sandy Neck, Barnstable, 3 sparrows, 6 murre, 3 sheldrake, 1 coot, 1 grebe, 1 eider duck; Tarpaulin Cove Light, Tarpaulin Cove, about 20 black ducks; Thatchers Island Light, 3 yellow-leg plover, 1 black duck, 1 sandpiper, 5 geese.



For 1921: Bishop and Clark's Light, Hyannis, 1 English sparrow, 1 gold finch; Cape Cod Light, North Truro, 3 small birds with yellow-tipped wings; Cape Poge Light, Edgartown, 15 English sparrows, 1 old squaw, 5 unknown birds (from description probably auks); Gay Head Light, Gay Head, 2 coots, 2 cat birds, 6 yellow birds, 15 unknown birds (described as being similar to English sparrows), 2 yellow birds, 5 English sparrows, 3 unknown birds (from description, probably starlings); Long Point, Provincetown, 3 gulls, 1 tern, 1 black duck, 1 whistler, 1 loon; Minots Ledge, Cohasset, 3 yellow-breasted fly catchers; Monomoy Point, Chatham, 1 old squaw; Nantucket Great Point Light, Nantucket, 2 black duck, coots; Nauset Beach, North Eastham, 2 wild geese; Sankaty Head, Siasconset, 284 pine warblers; Thatchers Island (Cape Ann) Light, Rockport, 1 yellow-breasted song sparrow.

	1917.	1918.	1919.	1920.	1921.
Number of reports received out of a total of 58 lights.	51	52	44	51	57
Number of keepers who reported none killed	35	35	36	43	45
Number of keepers unable to furnish data .	3	8	—	2	1
Number of lights reporting fatalities .	13	9	8	6	11
Aggregate number of birds killed . .	383	130+	76	59	360

### *Migratory Bird Law.*

The effect of protection throughout their entire range to the migratory species is apparent with every passage of these birds through our section of the country. But funds to make the Federal law effective in fuller measure by proper enforcement have never been provided. As a means to this end, a bill known as the "Public Shooting Ground — Game Refuge Bill" is now before Congress, providing a Federal hunting tax of \$1 on all who hunt the migratory species. A part of the resulting revenue is to be applied to the enforcement of the migratory bird law.

But to ensure the preservation of these birds for all time, constructive measures are required as well as law enforcement, for the future of these birds is menaced by the gradual encroachment on areas heretofore used by them for breeding

grounds and resting places in flight. It is proposed to apply a part of the revenue from the Federal licenses to the purchase of the best of these breeding areas, to be closed to shooting and maintained for the use of the birds. The bill lays the foundation for a broad constructive policy, and its enactment is the step that is necessary to complete the greatest conservation measure that has ever been proposed. And it has the additional merit, lacking in so many deserving projects, of being self-supporting.

#### UPLAND GAME.

##### *Pheasants.*

The regulations by the Division of Fisheries and Game for the hunting of pheasants in the open season of 1921 differed from those of previous years in that they permitted the shooting of only cock pheasants.

When in 1914 the covers appeared sufficiently stocked to warrant a yearly open season, the Legislature conferred on the fish and game officials the authority to regulate the shooting. Bearing in mind the purpose for which the pheasant has been introduced, — to relieve the strain on the grouse and quail, and to serve as a game bird, — and bearing in mind, also, that even if entirely exterminated the pheasant could be restored by the expenditure of time and dollars, a liberal open season (one month) was allowed on both cocks and hens from 1914 to 1920, inclusive. During that time we continued to breed pheasants at two game farms and various small experimental plants from which were turned into the covers from 1914 to 1920, inclusive, 14,099 pheasants. During this same period the gunners took from the covers in open season 27,095 birds, according to their reports, and we believe many more were not reported.

When the question of rules and regulations for 1921 came up for consideration, it was apparent that, despite a gradual increase in the amount of stock distributed yearly, and the production of wild birds, the pheasant was hardly holding its own. In no locality was it reported abundant, and rare in many places where formerly it was present in substantial numbers.

The cause of the decrease is easily explained, — it is the result of shooting. While this is to a certain extent to be de-

plored, there is no such occasion for alarm as would be the case were it one of the native species. For, in the case of the pheasant, if all shooting were stopped during the next ten years it would come back fairly rapidly until all natural pheasant covers were substantially stocked. And if, at the end of that time, shooting were resumed under rules which formerly obtained, the same rapid decrease would be witnessed.

The natural history of the pheasant is considerably different from that of the ruffed grouse. While in the case of the latter the rule is a lean period, followed by one of comparative abundance, in seven to ten year cycles, with the pheasant it is a case of a steady decline, and just now we have come to a point of comparative scarcity. The wild life of the State is a constantly changing quantity, and no one set of rules will apply at all times. It should be dealt with according to the conditions of the moment. Therefore, admitting the scarcity of pheasants in the covers, and considering the fact that our best efforts in propagation have permitted the liberation on an average of but 1 young pheasant to every 2 square miles of territory in 1920 and 1921, it was apparent that at the present rate it would be impossible to keep up a reasonable stock unless those birds which survive each year could be given the best of opportunity to propagate. The logical course, therefore, appeared to be to spare the female pheasants and to permit the shooting of cock birds only, for the male pheasant is polygamous, and such being the case the killing of the cocks alone should result in the least possible injury to the stock.

The sportsmen of Massachusetts have been particularly favored in their privileges in respect to pheasant shooting, for New York State (where more pheasants have been propagated probably than in any other State in the Union) has an open season of four days a year, with a seasonal bag limit of 3 male pheasants, whereas Massachusetts has thirty days with a seasonal bag of 6 birds.

Before adopting this regulation an expression of opinion was asked at the annual sportsmen's conference and the sentiment was overwhelmingly in favor of protection to the hen pheasants. This was later confirmed by questionnaire to the sportsmen's associations.



We regard this as an experiment, which will be continued or abandoned according to the results, and shall continue to watch developments very closely, with the aim to give the sportsmen every opportunity, within reason, to gun this bird.

To the hardy pheasant the average winter presents no problems, and the stock that remained after the hunting season came through the winter with no noticeable loss, nested early, and brought off good broods.

On Nantucket, where shooting has been allowed only since 1919, pheasants have thus far showed no decrease.

In northern Berkshire County pheasants have never done well. It is planned (with the approval of the local sportsmen) to discontinue attempts to stock that section with pheasants, and to liberate instead as many rabbits as our resources permit.

*Pheasants (Cocks only) reported shot in Open Season of 1921.*

COUNTY.	Number reported.	COUNTY.	Number reported.
Barnstable . . . . .	28	Nantucket . . . . .	102
Berkshire . . . . .	46	Norfolk . . . . .	157
Bristol . . . . .	83	Plymouth . . . . .	110
Essex . . . . .	184	Suffolk . . . . .	1
Franklin . . . . .	40	Worcester . . . . .	191
Hampden . . . . .	94	Locality not reported . . .	1
Hampshire . . . . .	154	Total . . . . .	1,529
Middlesex . . . . .	338		

It will be seen that the total reported killed is smaller by 448 than that of last year. This may be accounted for, to some extent at least, by three reasons: first, the shooting was restricted to cocks; again, fewer pheasants came under observation in the field than has been the case in the last few years, and these were wild, and fewer fell before the gunner: further, the fact that the grouse were much more plentiful than for several seasons made the older gunners (deprived of their favorite sport during the period of scarcity) turn their attention again to this bird.

There is a further aspect of the case which will come in for increasing consideration, and that is the extent to which an



introduced species in time seems to lose the stimulating effect of a new environment. The ring-neck pheasant, when introduced into the Willamette valley of Oregon, bred very rapidly and distributed itself over a wide range. The birds sustained themselves well over a number of years. Recently there has been the report that the birds seem to be on the decline, without apparent reason. Biologists of that locality are beginning to take the view that the birds have begun to lose the stimulating effect of a new range. For some unaccountable reason the pheasants are not more than holding their own with our present open season and with an increased activity in artificial propagation. It may well be that they are failing to respond to the food and living conditions within the State.

*Ruffed Grouse.*

Through its entire range the grouse was benefited by a comparatively open winter, and the breeding season was satisfactory, judging from the large number of broods of young reported from many parts of the State. The indications were, however, that certain localities held more birds than others, or, to put it another way, the production was "spotty." The young birds seemed to do well in the early part of the season, but in many localities a dropping off in the size of the broods was noted as the weeks went by. The causes no one knows, but the fact remains that through some agencies the flocks were greatly reduced. During the early part of the open season the dryness of the cover made it a grave question whether or not a closed season should be proclaimed to lessen the fire menace. There were other periods during the balance of the season when, by reason of ice storms and rainy weather, hunting was difficult. While the season was not one of a plentiful supply, there was fairly good shooting in many sections.

The increase has not been as rapid as many optimists had expected. There are some localities, as, for example, the four western counties, where the recovery has been quite rapid. There are many others where the increase has not come up to expectations. Speaking in State-wide terms and of conditions at the close of the season, it is fair to state that the birds have increased practically everywhere, but that the rate of increase

was more rapid and more substantial in the four western counties than in the rest of the State. Nevertheless, good numbers were taken throughout the entire State during the season, and at the end of the season more birds were left for seed than at any time during the period of greatest decrease, that is to say, 1919.

### *Quail.*

It seems improbable that the quail will ever again establish itself over the State generally. For a good many years there have been no quail to speak of except in the section extending south from Boston, and including Cape Cod, this being the natural quail range. Over the rest of the State, though there are a few scattering covies, there is little or no increase, in spite of periods of entire closed season in certain counties.

As we have stated almost annually, the problem of the quail is the winterkill. Speaking generally, this is probably the one agency that can ever exterminate the quail on its natural range in this State. It is true that these birds may be reduced in a given locality almost to extinction, and yet, with two or three successive favorable seasons, they will regain ground rapidly. This is the situation in the State to-day. Quail are fairly abundant on the quail range. The winter was comparatively mild and the breeding season favorable, and the birds came along well during the summer and early fall. The increase as compared to the past two years was very pronounced, and good numbers were taken in many localities. The limited bag of four birds a day discourages many sportsmen from making a business of hunting quail. With the return of the normal supply it would be entirely reasonable to increase the limit to six birds per day.

The one bright spot in quail restocking activities is the result on the island of Marthas Vineyard. Several years ago, in 1915, the quail on the Vineyard were practically exterminated. Annual plants were made, and since that time they have been coming back gradually until single birds and small bebies have become quite common on the island.

### *Carolina Doves.*

Carolina doves seem to have held their own satisfactorily.

*Deer.*

The open season on deer for the period of this report (Dec. 6 to 11, 1920) was remarkable for the very large number shot, — 1,466 as compared with 833 in the previous year, an increase of 76 per cent. This number has not been equaled since 1913, which was the banner year in the whole history of deer hunting in Massachusetts. This was probably due both to well-stocked covers and to the unusually favorable field conditions. Pleasant weather prevailed, with no rains to keep the hunters out of the woods, and in the western part of the State, where the deer are most plentiful, there was a very light fall of snow, sufficient for tracking, while it was not cold enough to freeze and make stalking difficult. A gradual decrease in the number of deer is occurring in the more thickly settled portions of the State, though they hold their numbers well in Berkshire, Franklin, Hampden, Hampshire and Worcester counties. The annual increase still warrants a yearly open season, for in a thickly populated State, devoted to a considerable extent to agriculture, in justice to the agricultural interests which represent a large investment of capital, destructive wild animals, however desirable as game, must be kept within bounds.

*Record of Deer shot in Open Season of 1920, December 6 to December 11 (within the Fiscal Year 1921).<sup>1</sup>*

	BARNSTABLE.		BERKSHIRE.		BRISTOL.		ESSEX.		FRANKLIN.		HAMPTDEN.		HAMPSHIRE.	
	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.
December 6 . . . . .	10	3	26	26	4	2	9	2	59	49	18	13	22	24
December 7 . . . . .	3	3	29	22	4	4	1	3	31	32	18	14	15	11
December 8 . . . . .	3	3	23	22	1	-	1	-	19	22	8	8	7	4
December 9 . . . . .	3	4	16	14	2	-	1	-	16	13	7	2	8	5
December 10 . . . . .	-	-	22	15	-	2	1	3	13	14	1	3	7	1
December 11 . . . . .	9	7	43	31	11	3	2	1	29	32	33	26	23	25
Totals . . . . .	28	20	159	130	22	11	15	9	167	162	85	66	82	70

<sup>1</sup> Open in all counties except Suffolk. One deer to each person.



*Record of Deer shot in Open Season of 1920, December 6 to December 11 (within the Fiscal Year 1921)<sup>1</sup> — Concluded.*

	MIDDLESEX.		NORFOLK.		PLYMOUTH.		WORCESTER.		LOCALITY NOT REPORTED.		TOTAL FOR STATE.		
	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Bucks.	Does.	Totals.
December 6 . . . . .	8	6	1	1	8	6	38	27	-	-	203	159	362
December 7 . . . . .	4	1	1	1	10	-	18	18	-	-	134	109	243
December 8 . . . . .	3	1	2	-	5	3	15	9	-	1	87	73	160
December 9 . . . . .	1	3	1	-	3	5	15	7	1	1	74	54	128
December 10 . . . . .	-	2	1	-	6	4	13	8	-	1	64	53	117
December 11 . . . . .	3	2	6	2	12	11	77	67	1	-	249	207	456
Totals . . . . .	10	15	12	4	44	29	176	136	2	3	811	655	1,466

<sup>1</sup> Open in all counties except Suffolk. One deer to each person.

Both the number of deer found damaging crops and shot by farmers, and the total of claims for reimbursement for damage to crops by wild deer, have lessened materially in the last few years, as shown by the following table:—

YEAR.	Number of Deer shot damaging Crops.	Amount claimed for Damage to Crops by Deer.
1903 . . . . .	No data	\$237 30
1904 . . . . .	No data	392 25
1905 . . . . .	No data	1,117 05
1906 . . . . .	No data	2,038 73
1907 . . . . .	16	2,912 78
1908 . . . . .	17	4,370 03
1909 . . . . .	198	7,923 09
1910 . . . . .	327	7,351 84
1911 . . . . .	232	9,526 82
1912 . . . . .	313	15,682 13
1913 . . . . .	195	19,977 29
1914 . . . . .	212	9,983 48
1915 . . . . .	254	9,132 81
1916 . . . . .	208	9,713 12
1917 . . . . .	223	10,125 21
1918 . . . . .	136	6,979 30
1919 . . . . .	143	4,891 90
1920 . . . . .	97	5,577 40
1921 . . . . .	96	4,763 00

### *Moose.*

By chapter 257, Acts of 1921, farmers were given the same protection against damage by moose that they have had in the case of deer, — by reimbursement for the amount of the injury. There has been more or less complaint on this score in the past; for, though not present in great numbers, there are some moose at large in the more remote sections of the State, some, doubtless, having wandered over the New York line, but mostly survivors or descendants of the moose herd on October Mountain, the Whitney estate. Several moose were killed during the week of the open season on deer in December of 1920, — a yearling moose on October Mountain, Washington; two others

in Washington and one at Otis. The latter was a bull moose, with 46-inch antlers showing 21 points, 10 on one side and 11 on the other, the palms or paddles deep, and the whole head perfectly formed. One observer who lives in Otis and who has had a large opportunity to observe the moose, estimates that there are at least one hundred moose in the State. Even if this statement were discounted by 50 per cent, it would still be remarkable that so many of these animals are at large.

### *Squirrels.*

Though some localities have gray squirrels in plenty, and in increasing numbers, the report is pretty general that they are becoming less numerous. While the decrease has been apparent for some years, the cause is not known. The destruction (pretty near total) of the chestnut forests, and the consequent reduction in the food supply would appear to have some bearing on the case. It is a well-known fact that squirrels will travel considerable distances in search of a food supply.

### *Hares and Rabbits.*

All wild life had an excellent breeding season, and both rabbits and hares were abundant in the early fall. In many localities there were large increases. In some few districts the native stock particularly was scarce, but that condition was not general over the State. There were 1,073 white hares bought and liberated by the Division, and a good many in addition by the associations. This has been done for a series of years, and the liberated stock is said to be multiplying fast. For instance, 6 hares were liberated by an association in a certain locality in Princeton. Subsequent records kept by the club showed over 40 taken from that same area during one winter. In the Forbes swamp, lying in Carver, Middleborough and Rochester, some 7 miles long and varying from 1 to 4 miles in width, an ideal place for white hares, the stock was nearly depleted. There were liberated by the Middleborough Fish and Game Association and this Division 10 white hares in 1918, 52 in 1919, and in 1920, in various parts of Middleborough, including the swamp, 188. The stock increased re-

markably, and the district warden knows personally of from 125 to 150 killed in this swamp in the winter of 1919-20, and the numbers taken the following winter were even better.

On Marthas Vineyard the native rabbits are scarce, many having been killed by disease in the spring of 1920. Every summer there appears to be much mortality among the young from wood ticks and fleas. Forty rabbits trapped on Nantucket and 54 northern hares purchased in Maine were liberated on Marthas Vineyard. No evidence has come to hand that the Belgian hare bucks or the black-tail jack rabbits liberated in past years ever bred, and no further effort will be made along this line.

On Nantucket cotton tails were quite plentiful, but the white hares liberated last year have not bred well.

Legislation this year opened the season on rabbits and hares in Dukes and Nantucket counties from November 15 to February 15, as against an open season of October 20 to January 31 in the rest of the State.

The sportsmen are beginning to realize more and more the desirability of starting the hunting season on rabbits well into the fall. Up to the close of this report fewer rabbits than usual had been taken over the State as a whole.

#### FUR-BEARING ANIMALS.

During the winter of 1920 and the spring of 1921 trapping was unusually light, and the catch below normal. The large western houses early in the fall of 1920 advised the trappers not to take skins, prices being low and a large stock of furs on hand. It was feared that the influx of an additional supply of skins would demoralize the trade in general. The season opened on November 1 with mild weather, and with practically every one putting out a very low and conservative price list, this heavy drop from war-time prices offered no inducement to trap. One dealer estimates from 25 to 40 per cent of the trappers refrained from taking skins.

The fur dealers express approval of the new law establishing closed seasons on fur-bearing animals as tending to raise the quality of the product. One concern reported that practically no unprime fur was offered during the year.



The annual catch of muskrats is undoubtedly the State's most valuable fur asset. It is a satisfaction to be able to report these animals as gradually recovering after the tremendous reduction during the period of the high prices. On the other hand, there is still too much taking of the skins during the early part of the trapping season, when the weather is mild and the skins are not prime. It would be much better to delay trapping until late in the winter, continuing to the close of the season. It is a question for further study whether there should be any open season on muskrats in April.

The fox suffered as much as any of the fur bearers during the period of intensive trapping, but with the drop in the demand for furs they have had a chance to come back. The result is that in certain localities where they were most persistently trapped the stock is to-day scarce, but speaking of the State as a whole, the fox is greatly on the increase. The number of fox hunters is growing, and there is a correspondingly greater activity in the fox hunters' clubs. Many men are turning from bird hunting to fox hunting because they enjoy a much longer season to hunt. More interest, too, is being displayed in the production of high-class dogs, all of which argues well for the general situation. The fox has much to justify his economic existence, and the increase of hunters is a protection against an oversupply. The pursuit of the fox is a noble sport and the resulting recreation to an increasing number of hunters has a great value.

The live fox industry is growing in the eastern States, and there are ranches as far west as Missouri. At the Second Annual Live Fox Show, held by the American Fox Breeders' Association (chartered in 1918 under Massachusetts laws) in Boston Dec. 1 and 2, 1920, entries were made by 21 individuals representing New York, Massachusetts, Maine and Prince Edward Island. Eight entries were by Massachusetts breeders and of the 9 cups offered 2 were taken by Massachusetts exhibitors. Fox breeders are selling their stock for breeding purposes rather than as skins, and hold their best stock for sale alive.

## ENEMIES TO GAME.

*Cats.*

The problem of the self-hunting house cat continues. It is only justice to the wild life of the upland to say that this is the greatest single menace that now threatens. It is surprising to note the indifference to the situation in a State of advanced public opinion, such as Massachusetts.

Without attempting to recite the arguments pro and con, there is no doubt that thousands of cats roam sections of this State without any control. They are the property of no one, they serve very little economic purpose, and their destructive operations far exceed any consideration to which they are entitled on any other grounds. Legislation should be enacted establishing the status of the cat as property, and a system of registration established, at a nominal cost, merely sufficient to cover administrative expenses with no idea of revenue. Systematic efforts should be made to induce the owners of land to keep the number of cats on their premises at a minimum, while plans should be laid to humanely destroy those which roam the open. Likewise owners of cats in large and small communities should be willing to co-operate more closely than they have in the past with our efforts, to see that such cats are restrained during the breeding season of birds, which is in general from May 15 to August 15. It should be no hardship to either the owner or the cat itself that it should be prevented from roaming during this period.

*Starlings.*

Starlings have increased rapidly in all parts of the State during the past year, and bid fair to become as great a problem as the English sparrow.

*Hawks, Owls and Other Vermin.*

No pronounced flight of hawks or owls of any species has been noted through the year, and there is nothing to indicate that they have been present in more than normal numbers, or have done more than the usual amount of damage. Or, to state

the case another way, many of them have done the normal amount of good. Such a statement naturally opens up a large argument for and against the species. While it is true that some of these birds do a great deal of damage, and their existence is hard to justify economically (as, for example, the great horned owl and the goshawk), there are other species (as, for example, the red shoulder, the red-tail hawk and the sparrow hawk) whose activities go a long way toward justifying their existence. It is well to keep constantly in mind that we should proceed slowly in upsetting the balance of nature by attempting to exterminate certain species, and we generally find them interlocked, interrelated or interdependent on one another to maintain the balance throughout the animal kingdom.

Recently much discussion has arisen as to the extensive killing of muskrats by mink, and the depredations of the weasel. The discussion will undoubtedly continue as to whether the mink should be completely destroyed because it kills the muskrat. It is in this way that some of the most economically valuable adjustments of wild life are surveyed.

#### RESERVATIONS.

##### *Marthas Vineyard Reservation.*

The month of December, 1920, was mild for the season, and at that time about 60 heath hens were feeding on the cultivated areas of the reservation. The early months of the year were devoted, as usual, to the pursuit and destruction of vermin and in performing patrol work. Hawks were not quite as numerous as usual, but did some damage in May to the adult heath hens. Rats were more numerous than usual and did a corresponding amount of damage. Though the fight is maintained against them the year through, with the fall there is always an influx of these roving animals from the fields to winter in the buildings. There were 244 rats, 20 hawks and 14 cats destroyed during the year.

The usual crops were planted in the spring for the heath hens, the stock, and the small birds, — 11 acres of corn, 3 of clover, 1 of buckwheat, and a few rows of sunflowers.

The breeding season of the heath hen was not of the best.



Frost occurred three times in May and once in June, and apparently was the cause of the absence of many broods of chicks. But few broods were seen on the reservation, and in those seen there were but few chicks to each parent. The frost was severe enough to crack duck eggs.

The usual spring census of the heath hen by the State Ornithologist and the superintendent gave a total of 314 birds actually seen. This is a substantial advance over the actual count of last year, and unquestionably there are many more heath hen on the island which were not found and counted. It was observed that there were fewer heath hen about the fields of the reservation than at any time during recent years, but this may be accounted for by the fact that the winter was mild, that they were not fed much on the reservation, and that they had wandered over the island wherever food was abundant. The heath hen are more widely scattered than ever before, — a very desirable condition, for in case of fire or disaster the loss will be confined to the comparatively small number of birds in the immediate locality, whereas if localized the entire stock might be exterminated.

There were no fires on the reservation this year, nor on any part of the island, to do damage to bird or animal life.

In the fall the heath hen showed up well (a flock of 40 was seen in November), and it is apparent that the frosty breeding season was offset to some extent by the absence of fires and scarcity of hawks, which enabled a greater proportion of the hatch than usual to reach maturity.

The reservation was visited by approximately 300 persons from March to October.

#### *Myles Standish State Forest.*

The Myles Standish State Forest was conducted this year purely as a reservation, pheasant rearing being abandoned for financial reasons. The 12 breeders on hand were liberated early in the spring. Under constant protection the bird life, almost negligible when the reservation was established, is gaining ground. Pheasants are quite numerous, grouse increasing, but quail scarce. There are no mallards, but black and wood ducks are remarkably numerous. The mild fall held the wood



ducks here, and 20 were counted in one small duck hole on October 20. Eight wood ducks from the Sandwich hatchery were liberated within the reservation. Patrol work and the hunting of vermin has been carried along with the forestry work, and in spite of constant watchfulness, early and late, no violations have been found. There were destroyed during the year 12 foxes, 20 skunks, 8 great horned owls, 1 goshawk, 5 red-tailed hawks, 24 snapping turtles, 7 weasels and 10 cats.

### *Moose Hill Bird Sanctuary.*

During the past year the territory comprising the Moose Hill Bird Sanctuary in Sharon has been largely increased, a protected area of more than 800 acres being now maintained and patrolled in co-operation with the Massachusetts Audubon Society. In addition to this area, which comprises contiguous lands under a dozen private ownerships, several hundred acres of woodland in other parts of the town have been posted on request of the owners, thereby offering in this vicinity a protected area for the birds of a thousand acres or more. The sanctuary area now includes the summit of Moose Hill, on which stands one of the State forest fire observation towers, a spot visited annually by hundreds of people owing to its particularly fine view for many miles over the surrounding country.

Following the mild winter and favorable spring an increase in many birds was noted. Ruffed grouse are more plentiful than for several years past. Although their peculiar drumming seems to be largely a mating call, it is not infrequently heard on moonlight nights during the late fall and winter, and it has been heard here during every month of the year, and at every hour of the day and night.

Several pairs of woodcock nested in the sanctuary. They arrived this year on the 12th of March, nineteen days earlier than the year previous, and from this date to the 28th of May their wonderful, ecstatic "flight songs" could be heard every evening about sunset. On one occasion, in early evening in April, eight woodcock were noted at one time within half a mile along the roadside. The young from one nest under observation left their nest April 23, a few hours after hatching. Others are believed to have left a few days later.

Pheasants were seen less commonly, their preferred habitat being the lower grounds, although a few, raised and released earlier in the season, are observed daily about the headquarters.

From 15 to 20 black ducks wintered in the lower part of the sanctuary and are known to have bred in the Beaver Hole Meadows. A number of mallard and wood ducks released during the summer have been noted at various times. There seems to be excellent breeding ground for wood duck and black duck along the meadows of Beaver Hole Brook, the upper reaches of which remain open throughout the winter, although at present part of these marshes are open to gunners, who greatly deplete the breeding and migrating birds during the shooting season.

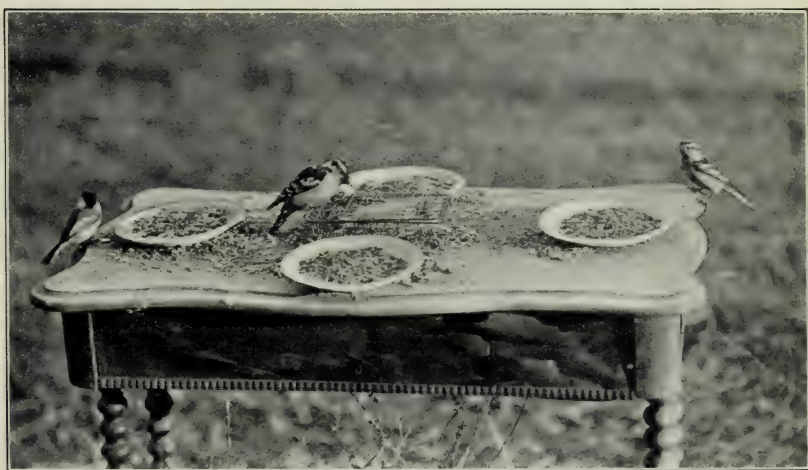
The sanctuary is particularly the resort of the song and insectivorous birds. A total of 116 species were observed during the year. Owing to other duties incumbent upon the superintendent, especially during May and June, when nearly 1,400 visitors were received, there was very little time for detailed nesting observations. However, 150 nests, representing 42 species, were under observation during the summer.

Mourning doves were seen more frequently than for several years past. A flourishing and increasing colony of house wrens has been established. Tree swallows and blue birds have been noted in increasing numbers, and have occupied many of the bird boxes, while the various warblers, sparrows, vireos, thrushes and others have taken up their abode about the grounds. The hairy woodpecker, crested flycatcher, solitary vireo, golden-winged warbler, brown creeper and hermit thrush — species but locally common in eastern Massachusetts — have all nested here this season, the latter being heard in song from March 27 to August 3. Fifty species could be observed about the grounds almost any day during spring migration, and on one day 67 were noted by the superintendent.

Feeding of the wild birds has been kept up the year through, and this work is shown to have been worth while in the increase of nesting birds about the house. Several species could be observed feeding at the window shelves and food stands every day in the year, and many of these brought their young into the dooryard for food. The usual routine of the work was



Moose Hill Bird Sanctuary, Sharon, Mass. One of the exhibition rooms in the farmhouse headquarters.



Moose Hill Bird Sanctuary, Sharon, Mass. Chickadee, downy woodpecker and tree sparrow at food table in dooryard.





continued, — the supplying of nesting boxes and nesting material and other methods for attracting birds, card cataloguing of all forms of wild life within the area, the entertainment and instruction of visitors and bird students (of whom there were 4,000) and the patrol against violations of the game laws. Only one arrest was necessary, and, considering the large number of people who have access to the grounds, this shows a general respect for the purposes of the reservation.

The banding of wild birds, in co-operation with the United States Biological Survey, has been continued. Although lack of time and traps was a handicap, 119 birds of 17 species have been banded and recorded this year.

Gray squirrels and rabbits have bred abundantly in their respective haunts. A few varying hares were released. Deer are seen occasionally, but have been too frequently disturbed by dogs running wild through the woods to remain long in one place. Tracks of raccoons were noted about the ponds, and the strange, humanlike cries of these animals have been heard in the woods at night.

A few muskrats have been seen in our ponds and streams; also tracks of mink. In one instance during the winter, tracks of an otter were observed in the snow about the duck pond and stream flowing through it, this wily animal taking toll from our ducks as it passed.

Foxes have been seen occasionally, but have not been numerous. Several skunks and a number of hunting cats have been destroyed, as well as a few red squirrels and many rats. Field mice and moles have appeared to be far less common here than last year, and little evidence of their destructive work was noted through the winter.

Beaver Hole Brook, which rises among the hills of the sanctuary and flows for some distance through the lower part of the grounds, has long been noted as a trout stream, being stocked each season through the co-operation of neighboring sportsmen. Many fishermen visited this stream during the spring and summer, and several hundred trout were taken from its waters.

*Reservations under Sections 69 to 75, Chapter 131, General Laws.*

During the year no additions were made to the chain of reservations. Shortly after this law was enacted (in 1911), considerable interest was shown in the establishment of such reservations. In previous reports we have touched on the fact that little or nothing has been done to make conditions on the reservations more favorable for the wild life than the conditions which exist on adjoining areas which are not included in the reservation. On some occasions owners have refused the offers of our agents to plant grains, on the theory that such activity would give the State an easement. Others have come to realize that the establishment of such a reservation is at least a small cloud on the title to their land, and have been reluctant to continue with the project. Owing to our limited funds we have been unable to give these areas any extra patrol. The fact remains, therefore, that except for the moral effect of the posting by the State, nothing generally has been done by the landowners to make the areas increasingly attractive to wild life. Therefore the only practical benefit has been that which comes from the prohibition of shooting. It is obvious, of course, that the prohibition of shooting is of some benefit, and should result in a gradual restoration of the wild life on the area. But the main point is, the increase is not so rapid or so extensive as might be brought about were it possible to increase the food supplies, give some winter protection, and kill off the vermin.

Without attempting this year to discuss each reservation in detail, it can be stated that the wild life of these areas is slowly on the increase; that there has been no more increase in any of these localities as distinguished generally from the adjacent localities; that the public interest has not been any more noticeable than usual; and that there has been no attempt to broaden the plan by the addition of new reservations.

The Hingham Reservation was renewed for an additional period of five years, dating from Dec. 18, 1919.

## INLAND FISHERIES.

### GENERAL.

In our last report we pointed out that the stock in our ponds cannot much longer stand the unrestricted fishing to which it is subjected in the winter and during the breeding season. In our recommendations to the Legislature we advocated catch and sale limits and a shortening of the season as the proper measures to avert the danger. These recommendations were adopted to the extent of imposing catch limits and raising the legal lengths as follows:—

Wall-eyed pike or pike perch, 5 in one day.

Yellow perch, 40 in one day.

Horned pout, 40 in one day.

Black bass, 6 in one day (length raised from 8 to 10 inches, and season shortened by two months, being now closed from February 1 to June 20, instead of April 1 to June 20).

Pickarel, 15 in one day (length raised from 10 to 12 inches).

White perch, no change in the limit of 10 pounds to one person, or 15 pounds to two persons, per day (length 7 inches).

Sale on all species was restricted to a legal bag limit.

While these restrictions will help to some extent, the need is still urgent for complete prohibition of the sale of fresh-water fish, and closed seasons on those species still lacking this protection.

We must continue to emphasize the proposition that no great progress can be made in maintaining and increasing the supply of fish in our fresh waters so long as they may be exploited as a commercial proposition. It is equivalent to the outlay of substantial sums each year to put fish into the streams and ponds while at the same time maintaining a system which practically places a premium or bounty (since they may be sold) on every one that is caught.

For a number of years we have had before us the problem of developing some suitable food fishes in our larger rivers. The extensive reaches of the Merrimack River and the Connecticut River have been practically unproductive over a period of years. The conditions existing on the Connecticut River, both in



Massachusetts and Connecticut, make it unlikely that fishways will be installed for some time, if ever. And assuming that fishways were provided, it is a question whether there are any fish to use them. The principal run to-day in the Connecticut is a limited number of shad. No fishway has been devised, up to the present time, which the shad will use. It is conceivable that substantial runs of alewives might be brought back to this river in line with the work that has already been accomplished in the Merrimack. In the meantime, it would seem that the large areas of the Connecticut River from the Connecticut State line to the New Hampshire State line should produce some species of food fish in substantial numbers. Since the various species of catfish seemed to hold the greatest possibilities, there have been planted in the Connecticut River, between October, 1920, and Nov. 30, 1921, 6,100 fingerling catfish from the United States government, and 1,445 adult catfish received through the courtesy of the State of Pennsylvania. There were also planted 200 buffalo fish received from Pennsylvania.

We would emphasize that this is purely an experiment, the result of which will not be known for several years.

In the Merrimack River in the spring of 1921, and prior to the run of alewives, the fishway constructed at the Essex Company's dam at Lawrence was put into operation. No salmon had been reported in the river earlier in the spring or during the preceding year. At the time the fishway was opened it was not known whether any species of fish was available. But a number of alewives were observed ascending the fishway, and this small and rather scattered migration continued throughout the usual period.

On Nov. 14, 1921, the fishway around the dam of the Locks and Canals Company at Lowell was completed, and therefore the Merrimack River throughout its entire length in Massachusetts is open to the sea. Should the run of alewives increase, the most beneficial effect on the fresh-water species in the river would be the appearance of a food supply in the shape of young alewives. Whether or not any of the fresh-water species will attempt to descend the fishways remains to be seen, and whether any of the fresh-water species will go up



into the upper reaches of the stream is likewise to be determined.

While the Merrimack has been stocked from time to time with various species, none have become established. Believing the catfish to be as well adapted to the Merrimack as to the Connecticut, arrangements have been made for stocking it as soon as catfish can be secured for the purpose.

Here, again, the work is of an experimental character, and in all probability two or three years must pass before it can be known to what extent the effort has been successful.

When all traces of the chemicals spilled into the Westfield River (West Branch) by the railroad wreck of last year had been effaced, plants of trout were made to offset to some extent the loss of stock through the accident, — 500 yearlings in June, 8,000 fingerlings throughout the season, and on November 27, 260 yearlings. Good catches of fish were taken during the year at Middlefield, both above and below the dam, and down the stream below the location of the wreck.

In the West Branch the already existing supply of brown trout is being supplemented by plants from our stock.

#### WINTER FISHING.

Owing to the rather open winter the usual amount of ice fishing was not done. In sections where conditions were more favorable to this sport there were varying returns. Poor fishing was reported in a number of the western districts, much of which may be attributed to the systematic winter fishing of the ponds of that locality made possible by the longer favorable conditions, — namely, a longer period of ice.

Winter fishing has many features that are pleasant, and a substantial number of our fishermen look forward to it as their annual sport. It is with reluctance, therefore, that we suggest the advisability of its curtailment. But the fact remains, as pointed out on previous occasions, that the prevailing regulations with respect to this branch of the sport are entirely wrong. It is an elementary principle of wild life protection that immunity should be granted a species immediately prior to and during the breeding season. The principal fish taken in ice fishing is the pickerel. The pickerel spawns very shortly after

the ice goes out of a pond. Prior to that time the females are congregating on the breeding grounds, which in every pond are well known. The effect is to localize the stock. The females are particularly voracious because they are carrying spawn, and it must be nourished and developed. The result, therefore, is that the fishermen go on a pond, and from previous experience are able with some success to locate the areas of abundance. Ninety-five per cent of their catch of pickerel are female fish with spawn. They are killing the fish within two to three months prior to the time that it would spawn, and they are depleting the ponds of a species, the artificial propagation of which up to the present time has never been practicable. And they are killing the fish which is the staple food fish in our streams and ponds. The foregoing is not in any respect an exaggerated statement of the case; in fact, it could be put even more strongly. If the stock in these waters is to be not only maintained but increased, it is imperative to at least restrict ice fishing after the first of February, or even prohibit it entirely, as is the case in Pennsylvania.

The following ponds were stocked and closed to winter fishing under section 28, chapter 130, General Laws: —

POND.	Town.	Regulations expire —
Whalom . . . . .	Lunenburg and Leominster .	Jan. 1, 1924
Winnecunnet . . . . .	Norton . . . . .	Jan. 1, 1924
Congamond Lakes (except the North Pond) .	Southwick . . . . .	Jan. 1, 1924
Massapoag . . . . .	Sharon . . . . .	June 1, 1924
Horn . . . . .	Woburn . . . . .	Nov. 1, 1924
Quannapowitt . . . . .	Wakefield . . . . .	Nov. 1, 1924
Martin's . . . . .	North Reading . . . . .	Nov. 1, 1924

These ponds are closed to all fishing except between May 30 and October 31, inclusive, of each year, and the tributary streams are closed except between April 15 and July 31, inclusive, until the date the regulations expire. Only a hand line, or line attached to a rod or pole held in the hand, may be used.

The above regulations represent a modification of the former rules in beginning the open period on May 30 instead of

June 1, to permit fishing on Memorial Day. This change was adopted in response to repeated requests on the part of the fishing public. The modified regulations were adopted in May, 1921, and not only were applied to all ponds closed thereafter, but existing regulations on all closed ponds were made to conform.

### TROUT.

#### *Brook Trout (Salvelinus fontinalis).*

The reports of the trout fishing season were very favorable from all parts of the State where trout fishing waters abound. There were more and larger fish, and it was common for fishermen to get the bag limit of 25 in a day. In spite of heavy fishing and increasing interest in this line of sport, the streams bear witness to the efficacy of artificial stocking. We are frequently told of streams absolutely fished out in which trout have been thus re-established. One such is Black Brook, Hamilton, where this year many good strings were caught, many fish averaging from three-quarters to 1 pound. In other cases whole sections have responded to systematic stocking.

The very dry summer had the effect of drying up a good many of the streams, and there was a considerable loss of young fish. There are many possibilities for further development in the trout fishing of the State. There are many streams which could be benefited by blowing out holes in them at varying distances; in arranging barriers which would form pools; in the felling of trees across streams in certain localities to give protection to the trout in exposed places; and in the prohibition of fishing in the feeder brooks. In fact, it is not too far-fetched to argue that the State should acquire the proprietary rights for long distances on either side of some of our more important and reliable streams, and turn them into public fishing grounds. On these streams the practices above enumerated could be followed. The feeder brooks should be closed to all fishing, and should be systematically stocked each year through the planting of trout eggs in the spring holes, fry in the upper reaches, and fingerlings further down; and in the protected areas in the main streams each fall a substantial number of yearling fish should be planted, which would



spawn in the stream that year. Such public fishing grounds can never be acquired at less cost than it would be possible to take them for to-day.

*Brown Trout (Salmo fario).*

The work of the year with respect to brown trout was a continuation of our effort to establish a stock of brood fish. (See report of the Sutton Fish Hatchery.) The brown trout are not stripped until they have attained the age of two years; hence no eggs have been taken from our stock thus far. Next year we will have our own source of supply, which will be supplemented by the purchase of additional eggs until the yield of our brood stock is sufficient for all requirements.

Arrangements have been completed to concentrate the brown trout work at the Palmer fish hatchery. The water there warms up more rapidly than at the other stations; hence it is favorable to brown trout rearing. The interest in brown trout noted last year continues to increase, and numerous inquiries have been received as to when fingerlings will be available for distribution. From this year's hatch there were planted in the West Branch of the Westfield River, at Chester, 2,000 year-old fish. This stream is especially favorable to brown trout, and least adapted to the brook trout, or entirely unsuitable for the latter.

CHINOOK SALMON.

For the reasons outlined in last year's report, no breeding of Chinook salmon was done during the past year.

In several ponds an occasional specimen was taken. In Long Pond, Plymouth, upwards of 500 fish were taken during the entire open season. The supply of smelts has disappeared from the pond, as well as the large number of suckers. The herring planted in 1920, that the young might provide feed, spawned, and the young fish were seen circling the pond. There was apparently sufficient feed during the winter, but the salmon taken during the open season contained only a limited amount of food. Our wardens planted 1,000 young alewives in the pond during the spring. Whether or not the salmon in Long Pond are spawning is not known, but it is reported that small



salmon were seen. If this is the case they were produced by the stock in the pond, as no plants have been made by us in 1921.

The completion of the fishway at Lowell opened the Merrimack River from the New Hampshire line to the sea. During the spring efforts were renewed, but unsuccessfully, to locate any run of Chinook salmon in this river or contiguous waters. Though the fishway at Lawrence was in operation and some alewives passed over it, no salmon were observed at any point. Several rumors of the capture of salmon were investigated, in locations ranging from the Merrimack River itself to Chatham, where one was taken in a trap, but on each occasion the fish proved to be Atlantic and not Pacific salmon. One handsome specimen weighing  $16\frac{1}{2}$  pounds was taken in February by a flounder dragger off Rockport, but proved to be an Atlantic salmon. During October and November the mackerel catches of the netting crafts landed at Gloucester were carefully watched, but while a few small fish of the Atlantic species were landed, not a trace of the Chinook or Pacific variety was found.

As a side light on the problems of fish propagation and the efforts to restore species which have become practically extinct, we mention the sturgeon, which found its way up the Merrimack River and established itself in the pool at the foot of the falls at the dam of the Essex Company, Lawrence. It created considerable local interest, and was eventually captured on June 25. It weighed 347 pounds and measured 8 feet in length and 18 inches in circumference. Time was when the sturgeon was a valuable food supply in our streams. Now they have deserted the rivers, being barred from their fresh-water spawning grounds by dams.

#### PIKE PERCH.

The same shortage of funds by reason of which white perch work was curtailed forced us to omit the collection and hatching of pike perch eggs. Here and there we hear of pike perch being taken as the result of plants in former years. But here again, the singular condition prevails, that out of a number of

representative ponds stocked there appears to have been but comparatively few where the fish have taken hold in good shape. Massapoag Pond, Sharon, which yields good catches, is one of the exceptions.

The pike perch fishing continues good in the Connecticut River in and about Turners Falls but the fish are taken during the spawning season, and it is a question as to how far this should be permitted until they have distributed themselves over larger areas of the river.

Negotiations have been practically completed to collect eggs for next year's hatching in co-operation with the State of Vermont and the United States Bureau of Fisheries.

#### PICKEREL.

The reports this year reflect the beginning of the decline in pickerel fishing, which was inevitable on account of the heavy ice fishing, the capture of spawn-bearing females, and the practice of market fishing. It is a matter for wonder that the pickerel have stood up as well as has been the case. But now, although some sections still report average good fishing, all too common are the reports that in well-known pickerel fishing waters, from which a few years ago good strings were taken, fishing is falling off. Both the strings and the fish themselves are running smaller, and fewer large pickerel are taken. The good fishing during the summer of 1920 and the winter of 1920-21 was undoubtedly due partially to the thick ice of the previous winter (1919-20), which made it impracticable on many ponds to attempt winter fishing, thus practically amounting to a closed season. During the winter of 1920-21, owing to the openness of the season, there was less pickerel fishing than usual on many of the ponds. But in extensive localities, especially the western part of the State, about the usual amount of fishing was done. But the summer and fall fishing was reported as poor over a very large portion of the State. This would indicate that the respite given the fish during the winter of 1919-20 was insufficient to do more than give a noticeable increase during the following summer, and was completely neutralized by the drain on the supply during the past winter

in most localities where winter fishing was possible. There is a noticeable increase in the number of ice fishermen. The ponds are becoming more and more accessible by reason of the more general use of the automobile and the number of additional camps. Winter sports are becoming more popular in which winter fishing has played its part. All of this has resulted in the killing of an increased number of female pickerel shortly before the spawning period, and this is reflected in the falling off of the pickerel fishing.

It is only a question of time when the depletion will be such as to force additional protective measures. It resolves itself into the question as to whether we will take these precautionary measures before the stock has been so greatly reduced that it cannot quickly re-establish itself, or wait until the case is about hopeless. At this year's session the Legislature made substantial steps in the right direction. It raised the legal length from 10 to 12 inches, and established a catch limit of 15 pickerel in one day; but it still permitted the sale of the fish which might legally be taken in one day, and made no provision for restriction of ice fishing. As stated many times in our annual reports, we are of the firm belief that the sale of all freshwater fishes should be prohibited, the same as we prohibit the sale of all game. Any other policy is equivalent to putting a bounty on the fish taken, and there still exists in this State, as throughout the entire Nation, an element which is willing to exploit the natural resources for the few dollars represented thereby. We believe that, in addition to prohibiting sale, ice fishing should stop on the first day of February. We are reluctant to advise the complete prohibition of winter fishing, and suggest a compromise on this date in the hope that with the other protective measures it would make the more drastic measure unnecessary. With these steps taken we would be satisfied to await the result of two or three years before advocating a complete prohibition.

#### BASS.

Field operations in the collection of bass were limited to the taking of 84,000 fry from North Watuppa Lake, Fall River. These were nearly an inch in length, and were shipped direct



to applicants. Larger collections had been contemplated, but when work began the fry were too far advanced for successful seining.

More bass, both large and small mouth, were reported as having been taken this year than can be said of several years. In addition, more fishermen are beginning to appreciate the sporting qualities of the bass. It is a "finicky fish." For instance, one may go to a given pond on six days in succession, and the bass may bite on only one day, or possibly a portion of that one day, though as far as can be observed, the days differ little one from another as far as climatic conditions are concerned. But the fisherman who perseveres and is present on one of those days when the bass take hold will be amply repaid for his efforts if he will but use light tackle and fish as a sporting angler should.

The bass are now protected during the breeding season. There is a catch limit and a minimum length, *but the daily catch may be sold*. As far as a certain element is concerned, this latter proposition is equivalent to putting a bounty on every fish taken. The fishermen of this State should not rest until the sale of every species of fresh-water fish is prohibited. It seems too elementary to require emphasis from year to year, that you cannot kill your fish in the spawning season or during the period immediately preceding it; you cannot catch them in unlimited numbers; you cannot haul them to the markets and sell them, and at the same time expect to have your stock remain normal or to increase so that it may meet the requirements of a rapidly increasing number of fishermen.

#### WHITE PERCH.

The usual seining and distribution of white perch was suspended in 1921 through financial shortage. The only distribution consisted of 15,500 perch, secured by the seining crew working in co-operation with the Cape Cod Fish and Game Association of Falmouth in transferring stock from one local pond to several other ponds. We are very desirous of getting this splendid food fish well established in our ponds, and have followed it up systematically over a series of years. But the work is large and only recently begun. There are



some ponds which are yielding good catches; in others, fish are coming along, but are still small; while still others have been stocked too recently to show results. In many other waters containing white perch the fishing is growing steadily poorer, and we have been unable thus far to give them any attention. But we recognize it as a worth-while line of work which we shall not willingly abandon.

It is a singular commentary on things that while a white perch less than 7 inches in length may not be taken, nor more than 10 pounds in one day, no protection whatever is accorded this fish during the breeding season. We probably know less about the spawning habits of the white perch than any other of our fresh-water fish. The best evidence indicates that the spawning takes place over a considerable period, for which reason a longer closed period on perch than on many other species should prevail. It should certainly extend from March 1 to June 15 in order to give these fish the benefit of the doubt, and it would perhaps be even safer to extend the close season until July 1. We believe that the rank and file of the fishermen of this State, once they fully understand the situation, would much prefer protecting all species of fish during the spawning seasons, realizing with satisfaction during the time allotted to the catching of their favorite fish, that they were giving the fish every chance to propagate and thus increase the supply.

#### SMELT.

Following a generally open winter, spring came early, and the spawn-loaded fish made their first appearance at the Weir River, Hingham, on the night of March 8, nearly three weeks ahead of the normal year. Both water and weather offered the most favorable conditions possible, and by March 10 an abundance of smelt was to be found in all the streams. A very large run was observed in all the South Shore streams for two weeks, until about March 22, when the numbers began to fall off, notwithstanding favorable conditions, indicating the first run had completed spawning. The new run, from April 13 to the freshet of April 29 to May 1, was reasonably steady. To the best of our observation the 1921 run of smelt was the greatest in a number of years, being about 25 per cent greater than that

of 1918, which was a record year. With the water at normal height throughout the season of 1921 there was no such destruction of spawn as occurs when, during a freshet, it is deposited on the high shoals, only to be left high and dry with the recession of the waters. The natural hatch was unusually heavy.

The usual collection and hatching of smelt spawn was omitted this year by reason of lack of funds. A little experimental work was done in hatching spawn in jars at the Weir River field station, using the pond water, and 3,000,000 thus hatched were permitted to pass direct from the hatching jars into the river. The spawn hatched in thirteen days, a shorter period than when handled in the batteries at Palmer.

Several bushels of spawn-covered grass were planted in the Jones River, Kingston, as has been done yearly since 1917.

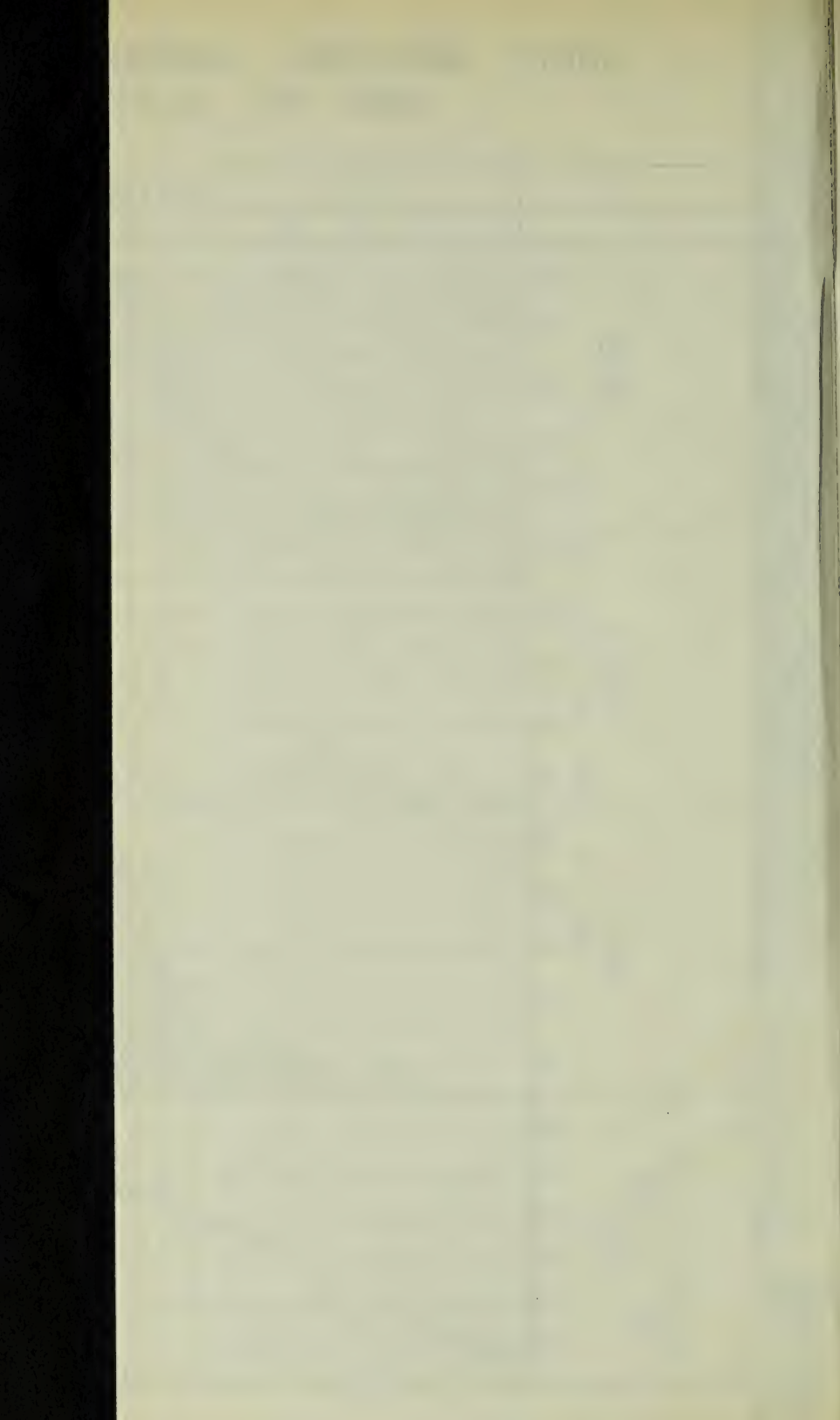
Careful observations have been made for several years on the smelt spawning in Weir River, Hingham, by Warden Orin D. Steele. The results of these observations are shown graphically in the accompanying chart.

The three upper sections give the comparative run of smelt in terms of a 100 per cent run for the years 1918, 1920 and 1921. The contrast between 1920 and 1921 is decided, the total run being far greater and starting sixteen days earlier in 1921 than in 1920.

The lower section shows the intimate connection between the temperature of the water and the run of the smelt, the fluctuations depending upon the sudden changes in the temperature and the heavy rainfall. It appears that a temperature of at least 45° F. is necessary for the opening of the spawning season.

No collections of fresh-water smelt were made for distribution. The run at Laurel Lake, Lee, was scattering, and apparently the smelt are dying out, — a source of gratification to local fishermen who believe them to be a detriment to the fishing. At Onota Lake, Pittsfield, the run (March 23 April 2) was not as heavy as in former years, but the fish were large in size, averaging  $7\frac{1}{2}$  inches. The taking of smelt for food or bait at these two places was permitted as authorized by chapter 57, General Acts of 1919.







## HORNED POUT OR CATFISH.

We learn that in many localities, though horned pout are plentiful, they run small. The fishing averaged fair this year, but with reports of depletion in many places.

The horned pout is one of the most popular of food fishes of the State, and yet practically the only protection given to it is the catch limit of 40 in one day. It may be taken at any time of the year, even in the breeding season, and the daily catch may be sold as a commercial proposition.

To the fisherman or the student who is honestly interested in the welfare of the wild life which supplies his sport there is no more interesting study than the breeding habits of the horned pout. It will repay any one to go to one of our great ponds during the early part of June to seek and watch the female pout convoying its brood of young in the shallow waters around the shores. And if he is of the right sort, he will go away resolving that in succeeding years he will forego his sport from the first day of March to at least the fifteenth day of June, to give the species a chance. And he will also feel that any fish taken under the length of 6 inches (and it would be better 7) is so small that it ought to be put back. The horned pout is a hardy fish and will stand all of the treatment incident to this operation. There is the complaint that the pout in many ponds are small. This is not to be wondered at, for the brood stock is so nearly killed off that the fish are little more than holding their own. In many ponds the stock is being reduced, and in many others the fishing is practically gone. The time has passed when any fisherman should be permitted to go on to our great ponds, take his 40 horned pout in a day or a night, and market them to the public or to dealers.

Special efforts are being made to establish the catfish in certain of our large rivers in which other species do not thrive. This is discussed in the section on "Inland Fisheries." Attention is also being given to the improvement of the stock already in State waters. In line with this, 100,000 horned pout were purchased in the fall and distributed.

## BLUE GILLS.

There are a number of comparatively shallow ponds in the State in which the water is warm, with abundant vegetation for the support of large numbers of vegetable-feeding fish. These ponds contain usually horned pout, white or yellow perch and pickerel, with a scattering of smaller species of sunfish. Believing that experiments should be made in the stocking with some species of sunfish which would attain a larger size and would have excellence as a food fish, work has been started with the blue gill.

The blue gill is the largest of the sunfish, and attains a weight of nearly a pound. It is an excellent pan fish, and the gamiest of the sunfishes. It is described in Jordan & Evermann's "American Food and Game Fishes" as follows:—

Color, rich greenish olive on back, becoming paler on sides; top of head dark greenish; opercles and cheek bluish; opercular flap rich velvety black, a small whitish spot above near its base; side with three or four broad darker greenish bars; fins all greenish, the pectoral palest, reddish at base; a large black blotch on last rays of dorsal, a similar one on anal; the dark bars become obsolete in the adult; no blue stripes on cheek; no red on fins; old individuals often with the belly coppery red or brassy.

It is a warm-water fish and propagates rapidly in waters favorable to it. (For details of work, see "Stockwell Ponds," under "Field Propagation.")

## FISHING PRIVILEGES IN GREAT PONDS.

*Permits to Seine Squibnocket Pond.*

Under chapter 124, Special Acts of 1917, permits to seine Squibnocket Pond on Marthas Vineyard were granted to F. Roger Allen of Chilmark, George W. Cooper, Wm. M. Marden and Arthur H. Vanderhoop, fishing together, and Amos P. Smalley, all of Gay Head.

Though permission to seine has been granted in several instances, not only this year but in the past, results have never been particularly successful. Seining conditions this year proved unfavorable, and two holders did not fish at all. One-half barrel of perch, the same amount of herring and 19 pounds of perch was the extent of the salable catch.

*Leases of Great Ponds.*

Two great ponds are now under lease for fishing purposes, under special acts, — Tisbury Great Pond, West Tisbury, under chapter 39, Acts of 1919, for five years from Jan. 1, 1920; and Chilmark Pond, Chilmark, under chapter 81, Acts of 1896, for five years from March 1, 1920.

No fish were reported by the lessees as having been taken from Chilmark Pond in 1920. In 1921, 1,705 pounds of alewives were taken and sold for \$44.79, and 8,440 pounds of perch, which were sold for \$2,015.71. The pond has been restocked each year by opening it to the sea, permitting the entrance of alewives and smelt to spawn.

The reports of the lessees of Tisbury Great Pond show that in 1920 approximately 5 barrels of perch were taken and sold for \$230.53, and an unrecorded quantity of alewives sold at \$1 per barrel. In 1921, 62 barrels of white perch were taken, which were sold for \$1,867.62, and 141 barrels of fresh alewives, which were sold for \$141. An additional 150 barrels of alewives were salted for future sale.

## SCREENS.

While the Legislature, under chapter 382, Acts of 1920, empowered the Commissioner of Conservation to expend such sums as the General Court may appropriate from time to time for the screening of ponds and rivers, no action was taken during the year in the absence of such appropriation.

## FISHWAYS.

During the alewife run of 1921, fishways, installed since 1918 through the efforts of this Division, were in operation at the dams of the following concerns: —

Connecticut Mills Company, Inc.	.	.	East Taunton.
Carver Cotton Gin Company	.	.	East Bridgewater.
Jenkins Leatherboard Company	.	.	East Bridgewater.
Stanley Works	.	.	West Bridgewater.
Ipswich Mills	.	.	Ipswich.
Essex Company	.	.	Lawrence.



We take this opportunity to publicly acknowledge the co-operation which has been given us by the owners of the obstructions on the streams which are suitable for alewife fisheries. The work in connection with the fishways was taken up actively some time after the war broke out, when extraordinary demands were made on all the manufacturing units with which we had to deal. The lack of help and the high cost of materials and labor were very unfavorable factors, to say nothing of a possible disarrangement of plans of the companies. Despite all this they have shown a disposition to work with us when once they fully realized the purposes of the plan. The Merrimack River has been opened from the ocean to the New Hampshire line, the Taunton River is nearly free from obstructions, and a substantial start has been made on the Ipswich River. Preliminary surveys were completed on certain other rivers which will be detailed when the actual work of opening the streams has been accomplished. As stated many times, our objects are — to provide a greater supply of fish for human consumption, and to also produce in the coastal waters increasing numbers of small alewives to serve as a food supply which will attract other migratory fishes.

#### *Saugus River.*

No action was taken in regard to the establishment of new fishways at the dams of the Cellulograph Engineering Corporation and the United States Worsted Company during 1921. The old fishways were tentatively in operation.

#### *Town, Satucket and Nemasket Rivers.*

The fishways at the Carver Cotton Gin Company, the Jenkins Leather Board Company and the Stanley Works were in operation, and, except for the adjustment of minor details as regards flashboards, were completed. The old fishways on the Nemasket River operated as in former years, and still require considerable alteration before they may become properly efficient.

Construction work was started on the fishway at the dam of the Easton Investment Company, at West Bridgewater, on November 23, and on the 25th several masons were at work with a good supply of lumber and cement. The contractor



struck a ledge where this was not expected, but through the assistance of our consulting engineer this difficulty was overcome and the construction carried toward completion.

### *Ipswich River.*

The Ipswich River presents three chief obstructions to the passage of migratory fish, in the form of dams owned, respectively, by W. F. Barrett, C. G. Rice and the Ipswich Mills. The establishment of fishways in the Ipswich River offers opportunity for the development of an alewife fishery, permitting this species to reach certain ponds in the headwaters for spawning. It will also prove a benefit to the fresh-water river fish, particularly as to the development of the brown trout in this river system which is now receiving our favorable consideration.

*Ipswich Mills Fishway.* — A straight-run fishway constructed at the Ipswich Mills in November, 1920, was in operation during the spring and summer of 1921, but proved unsatisfactory during low water, as the lower entrance was over 2 feet above the water level below the dam, thus making the passing of fish difficult or impossible. This matter was brought to the attention of this Department by Mr. John Russell of Ipswich, who noted that on May 5 many valuable breeding fish which had been carried over the dam in high water were unable to get back up the river. The fishway was visited on June 7 by a representative of this Department, who found that it was impossible for fish to enter the fishway, owing to the poor construction at the entrance. The Ipswich Mills expressed willingness to remedy this difficulty by building up an additional compartment at the lower end of the fishway.

*Barrett Fishway.* — Specifications and plans for a reinforced concrete fishway have been made for the dam of William F. Barrett at Norwood Mills, where an unsatisfactory fishway in form of a wooden chute had been installed by the owner. The matter was brought to the attention of Mr. Barrett, who was not particularly desirous of installing a fishway, inasmuch as no income of any nature was received from the dam. However, it is hoped that a fishway according to plans approved by this Department will be installed next year.

*Rice Dam.*—The attention of the owner was officially called on July 31 to the question of installing a fishway, and was met with most courteous co-operation on the part of the owner, who volunteered to install a fishway according to our specifications. A survey of the location was made, but owing to delay in formulating the working plans it was impossible to submit them before the end of the fiscal year.

### *Merrimack River.*

The fishways in the Merrimack River have been, until the last quarter of a century, a time-honored institution. The various laws and provisions which have been made concerning them well illustrate their importance in the early days. The reinstalling of the old fishways at Lawrence and Lowell, which had fallen into such a state of dilapidation as to be useless, has in recent years been the subject of considerable agitation among the local sportsmen, particularly the Lowell Fish and Game Association, which culminated in an act providing for the work.

Pursuant thereto the Division made a study of the dams at Lawrence and Lowell, plans and specifications were drawn up, and a fishway at the Essex Company's dam at Lawrence was completed Nov. 19, 1920. The difficult construction of this fishway required the expenditure of practically all the money provided by this act and additional appropriations of \$16,000. For this reason, it was deemed inexpedient to start work upon a second fishway until the results from the Lawrence fishway could be ascertained.

*Lawrence Fishway.*—It was with special interest that we followed the results in the new Lawrence fishway, which for the first time in many years offered a passageway for migratory fish at this point in the Merrimack River. Since this fishway represented a considerable outlay, it is with satisfaction that we report its successful operation during the past year.

The results in the spring and early summer of 1921 showed that a practical fishway for a 30-foot dam on a large stream had been devised,—a new departure in fishway construction; alewives were observed to ascend the fishway; the fishway was also used by fresh-water fish.

Difficulty was encountered in properly regulating the flow of water through the fishway. Arrangements were made to open it on May 1, but the excessive amount of water in the river at that time made it impossible to place the flume in position at the upper end of the fishway. On May 13 the fishway was operated with a good flow of water, which continued with considerable variation through the spring and summer. At times the flow of water was tremendous, at others slight, owing to the necessity of regulating the height of water at the dam by the Essex Company through the use of flashboards. An instance of this variation occurred on June 6, when, owing to the raising of the water level by flashboards, the volume of water passing through the fishway was such that no fish could overcome it. However, this variation should not prove a serious drawback, as during the important part of the season a uniform volume of water passes through the fishway, and methods of regulating the flow may be applied.

At the time of opening the fishway alewives were noted in the water near the entrance and a few had entered into the lower pocket. On May 24 numerous alewives were observed in the various compartments of the fishway, and could be seen mounting the various steps. Shiners, dace and a few suckers were also observed, and suckers were seen to pass from the upper compartment into the river above the dam. Observations were made from time to time by representatives of this Division, and a daily report was made by Mr. Warren G. Forbes, gate-tender for the Essex Company, as to the number and species of fish observed in the fishway from May 25 to July 6. The report of Mr. Forbes follows:—

*Observations at the Lawrence Fishway, 1921.*

DATE.	Alewives.	Suckers.	Shiners and Dace.	Eels.	Trout.	Sturgeon.	German Carp.
May 25 . . .	12	4	25	—	—	—	—
May 27 . . .	4	1	12	—	—	—	—
May 30 . . .	25	2	15	—	—	—	—
June 2 . . .	8	—	10	—	—	—	—
June 5 . . .	10	2	24	—	—	—	—



*Observations at the Lawrence Fishway, 1921 — Concluded.*

DATE.	Alewives.	Suckers.	Shiners and Dace.	Eels.	Trout.	Sturgeon.	German Carp.
June 7 . . . .	3	—	6	—	—	—	—
June 9 . . . .	2	1	7	—	—	—	—
June 13 . . . .	—	—	—	25	—	—	—
June 15 . . . .	—	2	2	3	—	—	—
June 17 . . . .	—	—	—	7	—	—	—
June 19 . . . .	—	1	—	2	—	—	—
June 21 . . . .	—	4	—	4	—	—	1
June 22 . . . .	—	—	—	—	2 <sup>1</sup>	—	—
June 23 . . . .	—	—	—	—	1 <sup>2</sup>	—	—
June 24 . . . .	—	—	—	—	—	1 <sup>3</sup>	—
June 26 . . . .	1	—	2	—	—	—	—
June 27 . . . .	5 <sup>4</sup>	—	—	—	—	—	—
July 1 . . . .	1	2	—	—	—	—	—
July 6 . . . .	1	—	2	3 <sup>5</sup>	—	—	—

<sup>1</sup> In fishway.<sup>4</sup> In lake at North Canal.<sup>2</sup> In South Canal.<sup>5</sup> Large.<sup>3</sup> Taken at base of dam. The fish was 8 feet long and weighed 347 pounds.

In order to obtain information relative to the season when this fishway should be kept open, Mr. R. A. Hale, engineer of the Essex Company, agreed to allow the water to run through the fishway during the summer whenever possible, and for this reason the steel flume which connected the fishway with the crest of the dam remained in position until November 18. The former dates for keeping open the old fishways as required in 1876 were from April 25 to July 1 with a natural flow of water, and from August 25 to October 1, when it was permitted to restrict the depth to 4 inches.

Additional evidence of the passage of fish over the Lawrence dam was given by the fact that Mr. Forbes found alewives in the South Canal of the Essex Company, and Mr. George W. Dearborn of Lowell found alewives and lamprey eels in Beaver Brook about one-quarter of a mile below the Pawtucket dam.

The results from the Lawrence fishway are particularly interesting, inasmuch as some of the foremost fish experts in the United States have held the opinion that the pollution of the



Merrimack River would prohibit the use of a fishway by anadromous fish, and that the fresh-water species would make little use of such a structure. We now know that alewives have passed through the fishway in spite of the pollution, and that the fishway has been used by various species of fresh-water fish.

Acknowledgment is herewith given for the courteous co-operation of Mr. R. A. Hale and others of the Essex Company, who expended much time and labor in perfecting the operation of the fishway.

The only disbursements, made from appropriations for the Merrimack River fishways, were \$12 for photographs, \$5.30 for lumber, \$195.30 for steel for the Lawrence fishway, and \$42.50 for surveying for the Lowell fishway.

*Lowell Fishway.* — The results with the Lawrence fishway showed that a fishway at the Pawtucket dam at Lowell was necessary, and steps were taken toward its installation. Conclusive evidence was at hand that alewives had passed up the Lawrence fishway and had been seen in Beaver Brook. None, however, were seen at the foot of the Pawtucket dam upon the visits of inspection of our representative, or upon the testimony of persons near by; but there was no question that if this species passed up the Lawrence fishway it would be only a question of time before they would assemble in numbers below this dam.

A meeting of Commissioner Bazeley, Director Adams, Mr. Stafford of the Proprietors of the Locks and Canals on Merrimack River, and various members of the Lowell Fish and Game Association, was held at the Pawtucket dam at Lowell on July 19, 1921, at which the situation was thoroughly canvassed and a modification of the original plans as presented by this Division was permitted the owners of the dam, who agreed to entirely finance the installation, provided that they be allowed to construct the fishway according to their own plans.

A committee of three was appointed for drawing up plans for this modification of the original fishway plans. Mr. R. Loring Hayward represented the Department of Conservation, Mr. A. T. Safford, the owners of the dam, and Mr. Geo. W. Dearborn, the Lowell Fish and Game Association. Mr. Hayward and

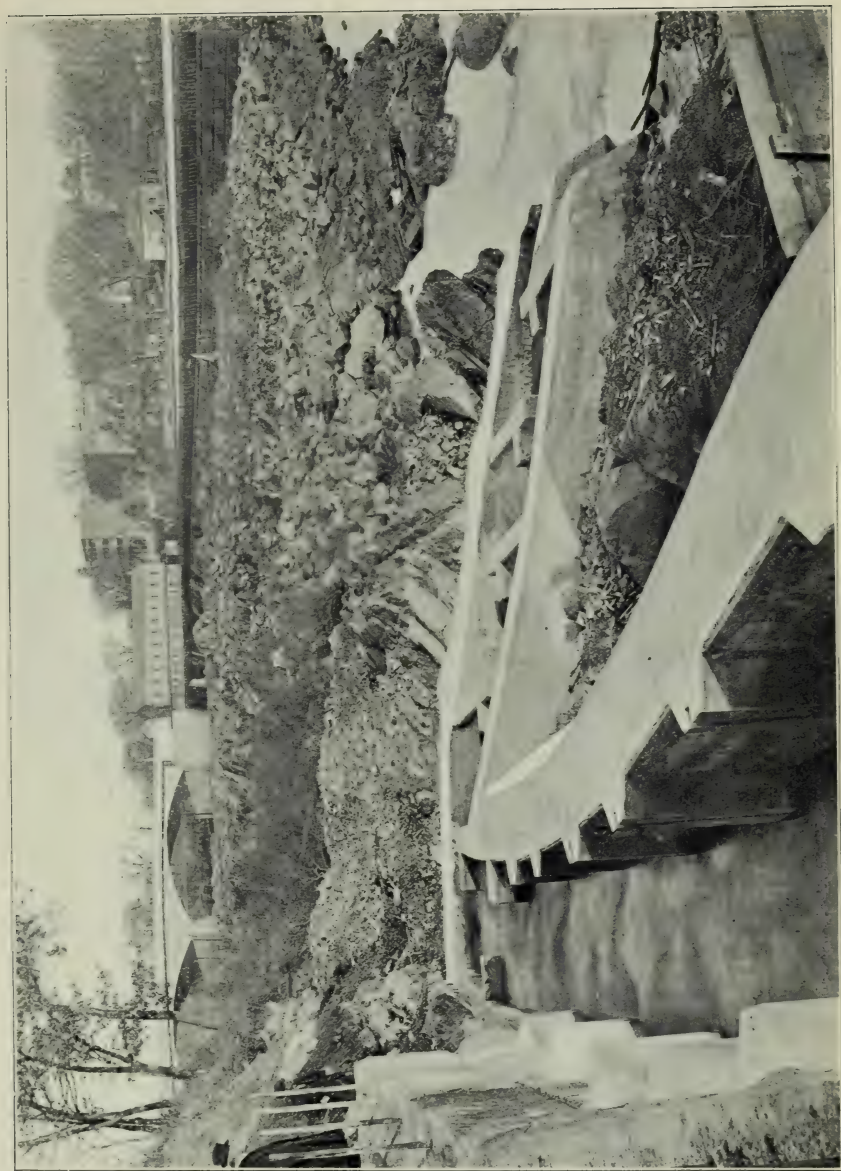
Mr. Dearborn acted only in an advisory capacity, submitting their advice and experience for the consideration of the company, which could take or reject the same. The Proprietors of the Locks and Canals on Merrimack River, by rejecting the previously submitted official plans of the Department of Conservation, agreed to build at their own expense a fishway which would be suitable, and, if unsatisfactory, to alter the same until satisfactory to the Department, and to waive claim to the five-year immunity from construction provided by chapter 130, section 19, General Laws. Therefore the owners assumed full responsibility for the installation of a practical working fishway. Work was started about Sept. 1, 1921, and the new fishway was completed by Nov. 14, 1921. It occupies the location of the former fishway and is built in an L-shape, following the Dracut side of Varnum Avenue to a point about 50 feet from the dam, then turning at a right angle down the slope for 36 feet to discharge into a pool at the foot of the dam. The entire structure is constructed of reinforced concrete, and in certain respects resembles, on a small scale, the Lawrence fishway.

#### *Brightman Pond.*

On Nov. 12, 1921, a conference was held at Westport with Representative Isaac U. Wood of Fall River and the members of the Westport town council in regard to the fishway at Brightman's Mills. All the evidence at hand was presented in chronological order by our representative. Local testimony brought out the fact that a fishway formerly existed in the old dam which was washed away in 1886, and that the alewife fishery had existed for many years previous to the building of the present unsatisfactory fishway in 1905. It was decided that the town council of Westport get in touch with Mr. Haffenreffer, the owner of the dam, and see if some policy mutually agreeable to both could not be worked out for the best interests of the alewife fishery.

#### POLLUTION.

Pollution of the Bungay Brook in the town of New Boston has been investigated by us, and also the alleged pollution of the Middle Branch of the Westfield River. In the latter case



Fishway at Pawtucket dam of the Proprietors of the Locks and Canals on Merrimack River, Lowell, Mass. Completed Nov. 14, 1921.  
(Reproduced through the courtesy of the Proprietors of the Locks and Canals on Merrimack River.)





the whole river system was inspected, and it was found that from a number of camps and residences along the stream drainage from toilets and kitchen sinks had been permitted to empty into the river. The matter was taken up with the local water boards and the State Department of Health. Whether or not action will be taken by the Division will depend entirely on whether the pollution is such as to be dangerous to fish life, and on this phase of the question further investigation is needed.

Pursuant to our policy of surveying various river systems a survey of the Mystic River system with reference to the problem of trade waste pollution has been started. Later the scope of this work will be extended to other rivers, treating each as an individual unit as regards remedial measures.

## PROPAGATION OF FISH AND GAME.

### GENERAL.

A very careful study was and still is being made of all the stations with a view to reducing the cost of output. For example, we consider it better business to produce 2,000 pheasants at a cost of \$4,000 than to produce 2,500 at a cost of \$6,000, and we do not intend to operate any station on a larger scale than will produce results at a reasonable cost. It is not possible to revamp the work at every station all in one year; but certain changes are already in motion, and others will be adopted from time to time as final conclusions are reached. For instance, with respect to the bass work of the future, it is a question whether the production of the past years and the future prospects will justify the continuance of the Palmer station as a bass hatchery, or whether bass work in all its phases should be discontinued except to seine up annually a sufficient number of fry to fill the station to its rearing capacity, distributing this fry when it has reached fingerling size. There are a number of ponds from which fry could be taken. This would eliminate the labor and expense of maintaining a brood stock of bass the year round, of preparing the ponds for breeding, all the labor incident to the hatching season, and the catching and transportation of adult bass to replenish depleted brood stocks (for the facilities at the hatchery do not admit of rearing fingerlings to adult size). To be sure, there would be the annual risk of failure because water conditions might make it impossible to seine the fry, but this risk seems to be no greater than the chance that, at the hatchery, changes in temperature might kill the eggs and defeat all efforts after expensive preparations for the hatching season had been made. Simplification of the production methods means also very substantial savings in overhead, and equipment released for other lines of work.

Excepting salaries and labor, the item of food for the stock of both fish and birds has been the heaviest item in the cost analysis of the large stations. A serious effort was made this year to reduce these costs, but without practical results. No

satisfactory substitute has been discovered for the ground-up liver which is now fed to the trout fry and fingerlings. It is relatively an expensive food. We are alive to the fact, and purpose to continue the investigations in the hope that this item of overhead can be substantially reduced by the substitution of some new food or of other ingredients used in combination with the liver. The feed of the adult trout is a combination of liver and lungs, and ground-up salt-water species, preserved in cold storage. Here, again, is a possibility for the substitution of less expensive food, but as yet no satisfactory combination has been discovered.

Realizing the costs of labor efforts were continued to maintain the essentials of an organization, relying as much as practicable on extra help during the busy seasons of the year.

#### FISH HATCHERIES AND GAME FARMS.

With the hatchery allowances reduced to the smallest possible amount on which it would be possible to operate the stations and still do business, the year's work was little more than the repetition of the work of any routine year.

##### *Palmer Fish Hatchery.*

Aside from minor repairs to the tenement house and the installation of hot-water system and bath, no changes or improvements were made. Two bass ponds started last year were put in condition for use this season for breeding ponds, and the large pond divided into two by a dirt bank, making easier the seining of the adult bass for transfer to the stock pond after the spawning season is over. There was no opportunity to complete the shiner pond started last year.

All battery work was discontinued, the shortage of appropriations having precluded the usual field collections of smelt and pike eggs. The rearing of Chinook salmon is suspended until the result of past stockings is more fully known. The year's work was therefore confined to bass, trout and horned pout.

*Small Mouth Bass.* — Each year there is more or less loss among the bass which are sent out for exhibition purposes, and from natural causes during the winter. The season started with 253 breeders brought over from last year. In May 158

adults were procured from the water supply ponds at Fall River through the courtesy of the Watuppa water board, to make up the quota of breeders needed for the ponds. It was rather late in the season when these collections were made, and the stock secured proved inferior to the hatchery stock, being small, and one lot came through in poor condition. Consequently the hatch from these fish was not particularly satisfactory. Seven out of the nine ponds were used in the bass rearing work, two being used as stock ponds. The two new ponds could not be so used, having been finished too late to permit of the development of a food supply in the water, but they were utilized for the fingerlings. Owing to the lateness of the season and weather conditions — cold nights and sudden changes in the water temperature which killed a portion of the eggs — there was a loss in the bass fry this year. But, although an unsatisfactory fry year (the distribution was 48,000) it was a most successful one in the output of fingerlings, of which 70,535 were distributed.

*Large Mouth Bass.* — Not much was done in the way of large mouth bass propagation this year. From a small natural pond on the grounds there were seined and distributed 8,000 fry and 8,625 fingerlings.

*Brook Trout.* — Egg collections from the wild stock in the brook were made as usual to add vigor to the brood stock at Sandwich. The 60,800 eggs taken were eyed out (some of the earlier eggs advancing to the fry state) and sent to the Sandwich hatchery — in all, 54,142. In return there were received from Sandwich the last of March 90,000 brook trout fingerlings, from 1 to  $1\frac{1}{4}$  inches, for rearing. They were placed in three rearing pools, and made such rapid growth that by the first of June they averaged 3 inches in length. Distribution was made by truck between June 7 and July 19. At the close of the distribution period there were 65,400 fish averaging 5 and many 6 inches in length which were distributed in the brooks of Hampden and Hampshire counties.

The rearing of the brook trout was an experiment to test the water for the development of advanced fry shipped from other stations. At Palmer the water is very cold in the winter, but warms up rapidly in the summer, so that trout eggs hatched



there come late. The fry handled at Palmer this year came from Sandwich, where the artesian water used for hatching is much warmer than the pond water at Palmer; hence the eggs hatched early at Sandwich, and the fry was thus placed in the rearing pools at Palmer much earlier than would have been the case with eggs hatched at Palmer. The water warming up rapidly in the spring and early summer was favorable to rapid growth. The more or less crowded conditions of the fish and the rising temperature of the water required the distribution in June and July. But so rapid had been the growth that the fish were ready for it. It is hoped that the water will not warm up to such an extent as will require distributions before the stock has attained an average length of 3 to  $3\frac{1}{2}$  inches. In order to be fortified against such a state of affairs we have laid plans to transfer to this hatchery our brown trout operations. The fact that the brown trout can stand much warmer water than the brook trout should enable us to make any change in policy that the physical conditions may require.

*Horned Pout.* — Horned pout culture has consisted in retaining in one of the ponds a limited number of horned pout breeders. This year, owing to a break in the dam by reason of a freshet, most of the small supply on hand was lost; the remainder, 3,250, were distributed. The 100,000 horned pout referred to elsewhere as purchased from a private dealer were also handled and distributed by the crew of the Palmer hatchery.

*Blue Gills.* — There were 800 blue gills received last fall from Pennsylvania which were wintered in one of the bass ponds and in the spring shipped to the Sutton hatchery for rearing.

#### *Sandwich Fish Hatcheries.*

The work at the Sandwich fish hatcheries proceeded on about the usual lines, with the exception of a few minor improvements. Replacement and repair work along with necessary construction was carried on with the general work of rearing brook trout.

At the Sandwich hatchery ground was cleared and four wooden rearing pools placed at the upper end of the cement pools, and wells driven to supply them with sufficient water.

Four additional pools were placed back of the hatchery building and tile laid to supply these with water from the other pools. These proved very successful in fingerling rearing. Work was begun on two more wooden pools 200 by 4 feet which will greatly increase the rearing capacity. Frames were built and covered with wire to fit over all wooden pools to keep out destructive birds and animals, from which substantial losses have been suffered. A new head trough was built at Sandwich to supply the cement pools. At East Sandwich some grading improved the appearance of the grounds.

There were 1,996,142 brook trout eggs handled, — 942,000 from the brood stock at Sandwich, 54,142 wild brook trout eggs from the Palmer hatchery, and 1,000,000 purchased to take the place of the eggs which should have been secured from the breeders at East Sandwich which were lost in the epidemic of 1920.

In continuation of the experimental work in planting eggs in the feeder brooks to hatch naturally, 400,000 of the purchased eggs were so planted. From the purchased eggs a loss was experienced among the fry with fungus, but as the fish grew older this was overcome. As the rearing capacity was limited it was necessary to plant more of the fish as 1-inch fingerlings than would have been done had facilities permitted further rearing, but it was highly important not to crowd the stock. Distributions began in June and continued until the latter part of October, as follows: —

Southeastern Massachusetts Fish and Game Association for rearing (1-inch fingerlings)	30,000
Palmer hatchery (1-inch fingerlings)	90,000
Canton Fish and Game Protective Association for rearing (1-inch fingerlings)	25,000
Worcester County Fish and Game Association (1 and 2 inch fingerlings)	11,000
Distributed in public waters (1-inch fingerlings)	239,000
Distributed in public waters (2, 3 and 4 inch fingerlings)	290,500
Distributed in public waters (advanced fry)	50,000
Retained as additions to brood stock	12,000

There were 1,002 adults distributed in the course of the year.

The disease which wiped out the brood stock at East Sandwich in 1920 reappeared in some portions of the plant, making

it advisable to plant at an earlier date than usual those fish which did not show any signs of it. It is our belief that these losses occurred from lack of complete sterilization of the ponds affected. The ponds were drained, all the sand and mud taken from the bottoms, the sides were thoroughly scrubbed with lime and copper sulphate, and every precaution taken which seemed available. In the light of those experiences the water was drained out of the ponds during the past fall, and these ponds, after being thoroughly cleansed, were refilled and a solution of copper sulphate was made and allowed to soak into the ponds as further precautions for the coming season. The water in the supply pond was disconnected, and only that supplied by the artesian wells was used.

#### *Sutton Hatchery.*

The improvement program carried on was largely in finishing the work undertaken under a special appropriation in 1920 for pond replacement and improvement, and in rebuilding the ice house. All parts of the old house were replaced except one side and the portion of one end where the refrigerator was located. Concrete was used to a point 6 feet above the sill, with an interior wall of chestnut, and any future repair work can be done without disturbing the shell of the building. The capacity was increased by 50 per cent, and is assumed to be ample for ordinary needs.

The program of general improvement carried on toward the close of the previous year had necessitated much cleaning and adjustment about the grounds, and this was carried on during the winter, as the generally prevailing open weather permitted. The brook was cleaned to the head springs, the channel deepened and made ready for fry pools, and an extensive program of cutting was carried out where the wild growth had encroached on the grounds. Trees about the grounds were pruned, and many not essential were cut out. The last of the dying chestnuts were cut into logs and drawn to a mill for sawing into lumber. The gravel pit was kept open and gravel carted over the soft ground when frozen to the lower part of the brook, and stacked up for future work. Much outside repair work and painting was done on the buildings, and this



was continued through the summer vacation period. The old hare crates were repaired and 25 new ones made. There were 502 new fish cans, destined for all stations, painted two coats, some three,—equivalent to painting 1,104 cans, and all were marked with a four-line stencil of 70 letters.

*Brook Trout.*—At the beginning of the year 2,450,000 eggs were received from commercial dealers, this supply being intended to be the quota for Sutton, a part of the quota for Amherst and Montague (to be shipped to them later), and the supply for egg planting. There were 437,000 distributed in the five western counties in the egg-planting experiments, and 455,000 reshipped for hatching at Montague after being held in the colder water until hatching was delayed so they could be handled at Montague without dangerously crowding the hatching facilities there.

There were 330,000 of the fry hatched and transferred to Amherst (less by 150,000 than the number intended for that place, owing to the discontinuance of pool construction for the season). The egg distribution was also smaller than planned, and in consequence there was a distribution of fry in the headwaters of suitable brooks to use up the surplus, amounting to 360,000. The remainder of the eggs constituted the station's supply for the year's work.

During the whole period from the time the eggs were received until the fry were feeding the operations were nearly normal, less work on the eggs because of the light loss, but more on the fry, apparently because the defectives showed up more in the fry than in the eggs. The fry in feeding showed a greater tendency to drift down with the current, and the loss was heavier in the beginning of feeding among those that had not strength to change from the yolk feed to the liver, and from the drift against the screens.

An added burden was the difficulty in coping with the excessive number of predatory birds and the unusual number of small yearlings left in the ponds, with a loss from them proportionally large. Otherwise than stated the fry started well and made a promising growth in the early period and in some of the best ponds went to the end of the season with no trouble or check in growth, but in the line of ponds on the



south side, and the smaller pools above, extending up the brook, the stock was decimated by chronic fungus, starting late in June and lasting through July. This was not unusual in its beginning, and many similar outbreaks have been suppressed quickly; but before it had progressed far the water supply decreased abnormally from the effects of the severe June drouth, and it took on a more virulent type that was very difficult to handle. The lack of any extra room, or overflow pools, made it impossible to take the most effective measures, — thinning out and changing to new waters.

Following this, while the fish were widely distributed in all rearing pools to get the most rapid growth to meet the policy of distributing a larger size, the movement of herons when the young left the nests and began ranging about for food brought in an unusually large number, and troublesome losses followed, heavier than in any year since the period, fifteen or more years ago, when it was necessary to closely cover all ponds. This increase of herons was general, and all stations where fingerling rearing was done had the same experience. An exchange on this subject was made with Sutton, Sandwich, Montague and Amherst, and it was agreed that the losses at all four could not have been less than 100,000 fish. If there is a permanent increase in herons, it may necessitate using covered ponds and a measure of control of the heron population to protect the hatchery stock and the wild trout as well.

The distribution came later by reason of the decision to grow the fingerlings larger, and partly by the reluctance of applicants to take fish at a time when the shrinkage of the brooks in the drouth made ultimate loss seem certain. The faults of a system which requires the availability of several people to move fish also slowed the work. But this will always be present so long as we must rely on the public to distribute the stock. These delays, on the whole, worked to advantage, as it seems certain that earlier stocking would have largely been destroyed by the effect of the drouth in shrinking the streams. The trout would have been deprived of the means of hiding or escape, becoming easy victims of the herons, mink and raccoons that were reported working on these nearly dried streams.

There were 2,020 yearlings shipped to Amherst. The year's distributions to public waters reached a total of 360,000 fry, 103,570 fingerlings, and 1,725 yearlings.

*Brown Trout.* — The work with brown trout was continued with a consignment of 100,000 brown trout eggs from a New York dealer. The fry was put largely in the former brood pond to get the greater growth obtainable there. This growth was secured, but the results in numbers were very poor, owing to the large proportion of very feeble fry. This fry appeared in numbers around the pond and near the screen, making little attempt to find food and not surviving long. This is not the usual condition with brown trout fry, which normally is hardy and vigorous, and these qualities must be sought in our own brood stock kept under conditions that will produce it. The brown trout, on the whole, made a better showing than the year before, and produced better results. The West Branch of the Westfield River at Chester received 2,000 yearling brown trout in April. At the close of the year there were on hand approximately 800 yearlings, 2,000 fingerlings destined for rearing to brood stock, and 2,000 fingerlings for future distribution.

#### *Montague Rearing Station.*

Montague rearing station was operated the entire year, and this period was substantially taken up in handling the crop of fish from the time the eggs were placed in the troughs, late in 1920, until the fingerlings were distributed, late in 1921. Other work, carried on according to season, time available or means, filled in the year with a program of continuous activity, and accomplished marked results in construction, upkeep and production.

Through the winter period, when in previous years the station had been closed, the crew was employed in pond construction and general outdoor improvement, and the work done then was largely instrumental in the increased production, which was nearly 100 per cent.

The fry were started in a much more varied range of conditions than the previous year, and they did well in all pools except in the wood pools first built; but these and the channel

pools, having a flow of water too strong for fry, could be stocked from an excess of fry carried in the starting pools. The newer pools were made by excavating in the spring areas, and were mostly fed by numerous minute springs in the sides and bottoms, and by reason of the soil had shallow margins. This led to a very considerable loss of fry during the migration of robins. They quickly learned to catch the fry in the shallow water, and fished very persistently. This may have been a temporary condition and possibly will not recur; but if it becomes a regular trouble this type of starting pool will have to be changed. Both robins and cat birds eat trout fry readily, but it is not often that they can catch them in any numbers.

Pools were developed by excavation around the tributary springs, and by building up with the material washed down from the work in the main channel. This work was done largely where the indented shore of the large pond on the north side offered a chance to cut off three arms of the pond and make three large rearing pools by carrying a dyke of the washed material down that side. The water supply from these ponds was taken in part from the brook, but numerous springs about the shores of each made a supply nearly sufficient. Due, perhaps, to the combined water supply, these ponds proved excellent for starting fry, and developed fingerlings so rapidly that after one crop was distributed the ponds were refilled from the brook.

On the main brook, extending down from the point where construction of fry pools was discontinued because of the swift current and large volume of water, a series of pools suited for growing yearlings or adults was started, and three were finished for yearling stock.

The small brook was put into use by replacing the old sand dams and digging and widening the channels.

The lower course of the east branch was changed, and for some distance was carried down the valley parallel to the main branch for the construction of the same type of pools, this line ending in a large pond of the best type for growing large fingerlings.

On a tributary of the east branch that received considerable surface flow one new pond was built.



The hatchery building was fitted with new troughs that fully doubled the capacity, and additional troughs were made to go with the old ones for an outside stand to get the required capacity for fry.

An extensive and varied program of improvement on the grounds was carried out, largely the details of finishing around the ponds and clearing for new work that could not be taken up the first year.

Along the valley, where the previous heavy growth had left numerous stumps, and the wash of the brook had covered a maze of logs and corduroy road, dynamite was used freely to blow the stumps and *débris* out of the ground, and it was piled up and burned in great quantities.

Eggs were received for hatching, 455,000 from Sutton and 561,000 from dealers.

There were 40,000 eggs used in stocking streams in the egg-planting experiments, and 48,500 fry were sent to Amherst before beginning to feed. Later 40,000 half-inch trout were transferred to the Amherst rearing station to make better growing conditions for those remaining. The rest, numbering 310,950, were carried until they reached the 3-inch size; 300,950 were distributed over a period from July to November, and 10,000 reserved to grow to yearling size. There were 500 yearlings sent to Amherst and 4,090 distributed to public waters.

Montague has reached a very large fingerling capacity, and a large proportion of these grow so rapidly that an early distribution is possible, though somewhat forced by the pools filling to capacity, and at present the most urgent line of work is to build for a greater number of the fast-growing fingerlings, and carry them longer for better quality.

#### *Amherst Rearing Station.*

Amherst was operated as a rearing station, opening in March with the feeding of fry, and closing in November when the fingerlings and yearlings were distributed, and as a one-man station during the greater part of the time. The only assistance provided was for getting the ponds in condition at the beginning of the season, and for handling the fish during the



heaviest of the distribution. In consequence of this, such improvements as were made were intended for making it more practical for one man to do the work.

At the beginning of the fiscal year work was undertaken to remedy some of the deficiencies of equipment; the shed used for can storage and meat room was rebuilt with a combination storage and ice house and meat-grinding room, a motor was installed for meat grinding and a line built for bringing in electricity. The camp was moved to a new location on a permanent foundation, where it could be enlarged or rebuilt and made to serve better its intended use. About midsummer a small garage was built near by, largely from materials at hand. The road was substantially rebuilt.

Since no funds were available for pond construction or increase of rearing facilities, work of this kind was limited to such time as could be spared from the ordinary routine work, or accomplished with the crew that was used for the general cleaning of the station in the spring.

The pools along the course of the brook were enlarged and fitted with more permanent barriers and larger and more secure overflow screens, and were extended down the brook where the current was too strong for fry, and enlarged to a size suitable for yearlings. Three pools were built on the left side of the brook below the dam.

The ponds were stocked with 48,500 fry from Montague, 330,000 from Sutton, and, during the summer, with 40,000 fingerlings from a surplus at Montague. There were received from Sutton 2,020 and from Montague 500 yearling trout. The general results were very good, and the fingerlings, because of being kept long enough to get a good growth, were an exceptionally fine lot. The general distribution was 184,300 fingerlings and 1,260 yearlings.

The conditions for growing the fish were nearly normal through the season, no floods were experienced from rains, and the severe drought did not materially affect the water flow. During the early part of the season the fry on one branch, evidently because of coming from yearling stock, showed a tendency to drift downstream, and during the same period fungus attacks were chronic. The stock was not materially

reduced below the capacity of the ponds, and the chief adverse effect was in the extra amount of work at a time when it could not be readily handled.

Later in the season the abnormal increase of herons that was general this year had its effect in persistent raids on the fish, until all the visiting birds were killed. The necessary protection for the fish involved a great amount of time and effort, and considerable loss resulted, although it was apparently less than at other stations where conditions were less favorable for protecting the fish.

### *Marshfield Bird Farm.*

Considerable progress was made toward perfecting the hatching and rearing equipment at the Marshfield bird farm. In the course of the year 84 new 20 by 10 portable brooder pens, wire-covered at top and sides (and painted with three coats of white paint) were completed. This necessitated grading a large part of the orchard, which was done by taking down a hill and filling in the lower lands. A larger heater was installed in the brooder house, and the heat extended through the lower part. Pipes the entire length of the house were covered with Upson board, and hinged sides built that might be lifted up for cleaning. The yards in front of the large brooder house were entirely completed, the tops covered, and division fences built. Cemented approaches to this house were made to keep out the vermin which had caused the heaviest losses of the previous year. The yards adjoining the brooder houses were graded and covered with loam to insure a rapid growth of green food from time to time.

At the beginning of the year the brood stock numbered 650 adults, all the product of the game farm. When curtailment of activities by reason of money shortage became necessary, this stock was reduced by the distribution of 256.

The egg collection totaled 15,020, of which 301 were broken; 138 infertile under hens; 3,158 proved infertile in the incubators and were rejected; 4,104 contained dead germs; and 181 set in pheasant nests in pens, with a total hatch of 7,138.

Of the hatched birds, 3,255 were lost, 351 unaccounted for, 3,332 distributed with a balance of 200 for future distributions.

During the previous year the hatching and rearing was entirely by the use of incubators and the heated brooder houses. The figures would indicate a very large percentage of loss by the operation, but when compared with the actual losses by the use of the hens and field-rearing methods it appears that the percentage of loss is very close. The advantages derived from the incubator-brooder-house method are the concentration of the work on a small area with resulting reduction in overhead expense of operation. We do not say that the use of this equipment in pheasant production has gone beyond the experimental stage, but believe that we are on the right track in our effort to produce substantial numbers of birds at a decreasing cost of production.

#### *Sandwich Bird Farm.*

During the winter of 1920-21 work on the combined wintering and breeding yards for the pheasants was continued and partially completed. The method of keeping the stock during the breeding season in large yards was the system followed, and so far has proved satisfactory. No additions were made to the quail or wood duck rearing units.

In order to carry on in a modified way the principle of the incubator and brooder houses five chicken houses were remodeled and coal-burning brooders installed. Adjoining each house was built a temporary yard.

*Pheasants.* — At the beginning of the breeding season in May, 152 breeders were available. They laid 4,860 eggs, all of which were incubated at the station either under bantams or in incubators. During the first part of the season it was found that the type of incubator used was not the best for the purpose, and this undoubtedly went far toward reducing the total of birds raised.

Of the 4,860 eggs set, 2,222 young were hatched, the balance being represented by broken eggs and dead or infertile germs. From the young hatched, about 600 were raised. Distributions were made of 530, and 40 held for brood stock. The balance of 30 birds is represented by 11 killed by vermin, and 19 at large which escaped when nearly full grown; 22 adults were distributed.



This was the second season of breeding pheasants at this station, and the first where the brooder house was used to any extent. While the production from the latter was not satisfactory, we have already started to reconstruct the brooder units and to install more of the best type of incubator. The experiments of the past year in using the large wintering yards as breeding pens proved to be fairly satisfactory. We believe that the results will be greatly improved during the coming year by the use of fewer cock birds, making available an increased yard space.

*Wood Ducks.* — At the beginning of the year 73 adult wood ducks were in winter quarters. At the time of transfer to summer breeding yards, March 15, the number had been reduced to 66 by the death or disappearance of 5 and the distribution of 2.

There were 402 eggs collected, 12 of which were distributed and 390 set under hens; 28 were broken, 71 infertile, 74 contained dead germs and 217 hatched. There were 130 raised beyond the danger point, and then, as the young had more liberty, rats and a large turtle decreased the number actually brought to maturity to 77. Distribution was made of 71, and 6 were placed in the yards with the adults. In the fall 3 adults were sent out for exhibition in the public park system of New Bedford.

The question might well be raised as to the advisability of continuing to breed the wood duck if viewed purely as a sporting proposition. But there was a time in the past, and not far distant, when this most beautiful of all our ducks was considered to be on the way to extinction. Fortunately, the intervention of the Migratory Bird Treaty Act has surrounded it with a protection which bids fair to restore it in reasonable numbers. In the meantime we believe that it has been the part of wisdom to continue the artificial propagation. There is a class of people, numerically large, who neither hunt nor fish, but who are tremendously interested in wild life. Having in mind this fact, we feel that we would be remiss in our duty if we failed to do our part in the rehabilitation of a species which lends itself to artificial propagation, though presenting many problems in such a connection.



*Quail.* — On Dec. 1, 1920, there were 136 adult quail in winter quarters, and 42 more in and around the bird farm which had escaped during the late summer. While during the winter there was very little snow on the ground, the birds did poorly and the death rate was greater than ever before experienced, so that by May 1 only 51 remained.

These were placed in breeding quarters, and the losses ceased until two weasels and a cat killed and injured 23 in a space of a few weeks. This completely destroyed some pairs, broke up other pairs, and disturbed the rest, retarding laying and resulting in poor eggs. Later, weasels destroyed 14 more, and others died, leaving only 5 which were released about November 1.

The 141 eggs laid were set under bantams; 84 hatched, and 40 were reared, 36 of which were distributed and 4 remained about the farm. Only 2 adults were released.

#### *Wilbraham Game Farm.*

This year marked a turning point in the history of the Wilbraham game farm. When the financial situation required the closing of one of the stations, the Wilbraham game farm was selected, for the production had been gradually falling off over a period of several years.

Year in and year out the old method had been followed of hatching and rearing by bantams and turning the chicks into the rearing fields, subject to the same dangers and mischances to which the birds in the wild are subject. By the old procedure eggs were set under bantams and hatched, and the hen with her young placed in a small coop in the rearing field. Under these conditions the chicks became contaminated with body lice from the hens, involving endless work in greasing and dusting them. Much time was required every night to shut the young in the boxes with the old hens, and to release them in the morning. Feed was placed on a board near the pen, and that which was not eaten at once, soured. Many of the young were trampled to death under the hens, and hundreds wandered off never to be heard of again. Any great change in weather, or a cold, heavy rain meant enormous losses, as

the chicks had no protection except the small coop, and practically none against vermin.

The amount of labor required was so enormous, and the losses in the rearing fields constituted such a large per cent of the hatch that for a couple of years the conviction had been growing on us that our stations were not producing birds at anything like the cost at which they could be purchased from private breeders. A radical change in procedure had been under consideration, even if the financial situation had not forced it somewhat prematurely. The conclusion had been reached that in the breeding of pheasants efforts should be directed to the substitution of incubators and brooder houses for hens as the means of reducing the cost per bird. The beginning of efforts on this line had been made when mallard duck rearing at Marshfield was discontinued and pheasant rearing begun by the method we had in mind and desired to test. Marshfield had been selected for the experiment because it was the only station equipped with an incubator house and a sufficiency of incubators and brooder houses for the trial. The first year's test, even with imperfect equipment, was so satisfactory that it seemed the part of wisdom to continue on these lines and gradually introduce the new methods at the other game farms.

By the henless method much work is eliminated, — all the care of the poultry, the preparation of nests and setting of hens, the removal of the hens off the nests and exercising them, and feeding and watering them each day; also all field work with the young stock, because, from the time of transfer from the incubator house to the brooder houses they are under absolute control. Changes in temperature have no effect, because the houses are kept at a uniform temperature, and the killing rains of the spring have no effect because the birds at all times have proper protection.

Therefore, with a successful method in operation at Marshfield, and an unsatisfactory one at Wilbraham, plans were made to close the latter as of June 30. At the Sandwich station pheasants had been reared but one year, and it seemed inadvisable to abandon the work just getting under way there, as well as the wood ducks and quail.

The proposed closing of the Wilbraham station was widely discussed in the press, and so much misunderstanding arose, through lack of knowledge of the real facts in the case, that it seemed only fair to all parties to thoroughly air the situation. With this end in view, open conferences were held by the Commissioner and Director on May 6 in the four western counties. With better understanding a much better feeling followed. But the actual closing of the game farm did not become necessary, for the ways and means committee authorized a transfer to the fund for propagation work of \$1,000 intended for new construction at Montague, \$1,200 for construction at Palmer, and \$800 from the appropriation for marine fisheries.

Changes in methods at Wilbraham were set in motion, — a combination of incubator-brooder and bantam methods, — and at the end of the season a good year's work can be recorded.

To put the new methods into operation some remodeling of the plant was necessary. All the wire netting enclosing the game farm was taken down and rolled up for future use or utilized at other stations. To house the stock, two henhouses were remodeled into ten 10 by 10 feet brooder houses, with sand-covered floors and equipped with coal-heated brooders. But, owing to lack of funds and labor (for the working force was reduced to the superintendent, his wife and one assistant) the buildings were very crudely finished. Early in the season the houses were too cold at night, and later it was almost impossible to keep them from overheating. The heat drew the boards apart and left wide cracks in the walls. Three covered frames were made and placed in triangular form about the hovers to protect the chicks from the cold winds of early spring. Before another rearing season these houses are to have a rat-proof cement floor which can be cleaned with a hose, which will keep them more sanitary with less labor.

For use in connection with the brooder houses ten 36 by 24 foot, wire-covered yards were built, each containing a burlap covered frame set on posts 2 feet high for protection from sun and showers. The large yards were built on grassland, which provided green food and a hiding place for the small birds. Another building is being remodeled into a 20 by 30 feet brooder house for next season's work.



Under such a system the young birds once placed in it come out either dead or alive, and we know what has happened to them and thus may profit by any loss, as distinguished from the field-rearing practices of the past, where hundreds of birds disappeared without any opportunity on our part to study causes of disappearance and seek the remedy.

As soon as the chicks were strong enough to leave the house the frames previously mentioned were set up to form a small yard, gradually enlarged until chicks were old enough to have the run of the whole yard.

The year's work started with 509 adult pheasants on hand. The first eggs were laid March 29, about nine days earlier than usual. The total egg collection was 17,056. Lacking facilities for handling all early eggs, some had to be distributed and later-laid eggs used for hatching. The later eggs being always inferior in fertility, this reduced the per cent of hatch and made late birds for distribution. Egg distribution totaled 7,413. Losses in handling amounted to 103, and 6,880 were set in incubators and 2,660 under hens. The per cent of fertile eggs was very nearly the same by both hens and incubators, the balance being slightly in favor of the hens. There was no noticeable difference between the two methods in rearing the chicks, but a really accurate comparison could not be made under existing conditions, as the equipment is still very imperfect. For instance, if the incubator house is properly ventilated the lower current is too strong, which affects the temperature of the incubator unfavorably.

The total young hatched was 4,206, of which 2,304 young birds were lost from all causes. A large number escaped through the wire before the yards were finished; at four different times the gates were left open and a pen of birds liberated; and about 75 young pheasants between five and six weeks old were taken when the henhouses were robbed. But the losses from disease and vermin were very small. The greatest loss was from an overheated incubator. Every year there is a considerable loss during the flight of the "rose bug." Some birds were lost from accident, others from packing and chilling. If chicks were allowed full range of the house they were chilled, and if confined close to hover were over-



crowded. There were raised to maturity 1,902 pheasants, 1,698 of which were distributed and 204 retained for brood stock. There was considerable loss among the brood stock during the summer, owing to accident, escapes, old age and lack of help to care for brood stock with the thoroughness of former years. Adults distributed, numbered 172.

As in previous years, green food was grown for summer feeding and a large quantity stored for winter use. The change in methods necessitated a change in the number of feedings per day and kind of food, more green and animal food being given.

The usual fight against vermin was maintained, and 2 cats, 104 rats, 2 horned owls, 4 crows, 1 sharp-shin hawk, 1 red-shoulder hawk, 4 gray foxes and 2 skunks disposed of.

### FIELD PROPAGATION.

#### *Stockwell Ponds.*

In the effort to discover a species of warm-water fish suitable for such of our depleted waters as are unfit for trout, the blue gill sunfish, propagated in the hatcheries of Pennsylvania, seems to offer promise. Studies of methods followed in that State were made, arrangements completed for a supply of stock, and a study made of possible locations in Massachusetts where the work could be carried out within financial resources.

The so-called Stockwell Ponds in the western part of Sutton, which are considered also for the culture of pout and perch, appeared to possess for blue gill culture special features of great value in the well-ordered tract of land that covered the necessary flowage, and a development of dams, ditching and grading that would make it possible to complete the control of the flowage and drainage. Arrangements have been made to take the property under lease with an option of purchase under very reasonable conditions. This is in line with our policy to always determine the value of a water area by actual use prior to purchase.

The Stockwell Ponds consist of four ponds resulting from four dams located on a mile of the main ditch of this area, which was formerly used for cranberry culture.

The area of the lot exceeds 80 acres, and is bounded for the full length on the west side ( $1\frac{1}{2}$  miles) by the county road leading from Millbury by Lake Singletary to West Sutton; at two points it is cut through by town roads crossing on the first and third dams from the lower end. This road system gives complete access to any point necessary to reach.

The upper dam, at what is locally called the Arnold Pond, when full will flow 12 acres.

The next pond, called the Middle or Schoolhouse Pond, and sometimes the Beanville Pond, at present covering 12 to 15 acres, will increase the flowage to over 20. These ponds are best adapted for breeding ponds by the character of the shores, which, by reason of being very inaccessible, give the adult fish very good protection.

The next basin is the flowage area for the lower dam, built to operate a saw and grist mill. About 5 acres of the upper part of this pond will be covered with water only slightly, and probably not enough to smother the grass that is growing very rank there now. This area can be made into an unequalled breeding ground for horned pout by the use of dynamite to blow out ditches and cross ditches, until the whole area will be a maze of intersecting channels and small islands, under the banks of which pout can excavate their nests with perfect security. This feature will make this pond most of any adapted to horned pout breeding, and it has, like the pond above, inaccessible shores, so that the adult fish will be well protected against poaching.

The small area of the mill pond is the only place in the area where the bottom loses its flat character and the stream makes a rapid descent; consequently, while this pond is small, it is the deepest of the chain. Public roads border on two sides, one on the embankment that makes the dam, and since it is exposed to fishing and has a restricted area suitable for breeding it can be used to the best advantage in growing a stock of fry in an experimental way, especially some of the perch that would be undesirable in the ponds above. Any escapes would go down to Lake Singletary, which is already stocked with bass and white perch, and is well suited for pike perch.

The old wheel pit below the road, about 30 feet across and 15 feet deep, offers excellent facilities for the construction of equipment for handling fish; sorting pens can be constructed where all fish not taken out above can be run down as the ponds are drained, sorted and graded for final disposition, and if jar hatching is added, the same pens can be used with only the addition of jars to make the equipment complete.

The work done thus far, while not extensive from the point of expense or time employed, has covered the most essential things for the orderly development of the pond system while permitting its use at the same time.

The temporary work done in the summer of 1921 flowed between 15 and 20 acres, about one-third where the water was raised on old flowage with lily root bottom, and two-thirds on brush and grass land, which was flowed to kill the vegetation and prepare the land for future use.

In April 800 two-year-old blue gills, received through the courtesy of the Pennsylvania Fish Commission, were placed in the ponds. They bred fairly well, but the extent of water they are in is so great for the number put there, that the greatest increase would not warrant a distribution before the second generation begins to breed.

Horned pouts can be grown in the same ponds with the blue gills, and there is an economic value in doing this, as an area of water as large as this under consideration will have a greater production by using it for breeding the two kinds. The whole system is well adapted to growing them, and it has been pointed out that some areas are exceptionally fine for breeding grounds. The native stock in the ponds was of unusual size and quality, but few in numbers owing to the small area flowed when the ponds were taken over.

Stockwell Ponds, when finally developed, will also serve as a very favorable breeding ground for black ducks and wood ducks.

#### *Shaker Mill Pond.*

Authority to control and use Shaker Mill Pond, Ayer, for a brood pond, from which the natural increase could be seined and distributed, was acquired in 1920. There were 200 large horned pout and 200 large yellow shiners put in that year.



But lack of funds has thus far precluded the repairs on the dam which are necessary to conserve the water supply, which at present is reduced to a chain of shallow pools. This location, after repairs of the dam, promises to yield a good crop of fish yearly at small expense.

#### GAME BREEDING BY PRIVATE ENTERPRISE.

Since the possession of game birds for propagating purposes and the sale of such propagated birds for breeding or food was legalized by sections 81 to 88, chapter 131 of the General Laws, a certain amount of breeding has been carried on by private individuals, some on a large scale, but mostly in a small way. The following tables, summarizing the reports of operations required by the terms of the permits, are of interest as revealing the extent and character of this activity:—

YEAR.	Number of Reports.	Number of Birds or Animals hatched.	Number of Birds or Animals reared.	Number on Hand at End of Year.	NUMBER SOLD, EXCHANGED OR GIVEN AWAY.		
					For Food.	For Propagation.	Eggs sold, exchanged or given away.
1912 . . .	167	3,451	No data	2,117	201	925	1,599
1913 . . .	372	8,181	No data	7,265	941	2,374	3,706
1914 . . .	314	11,272	3,336 <sup>1</sup>	7,024	809	1,303	3,696
1915 . . .	420	12,341	6,553 <sup>2</sup>	7,637	1,519	1,809	4,950
1916 . . .	470	12,450	8,245 <sup>3</sup>	8,619	1,420	2,979	2,081
1917 . . .	331	7,614	4,024 <sup>4</sup>	5,178	1,012	1,443	1,988
1918 . . .	238	4,273	2,017 <sup>5</sup>	3,469	356	997	1,491
1919 . . .	222	4,181	2,200 <sup>6</sup>	3,404	340	583	836
1920 . . .	215	3,567	2,182 <sup>7</sup>	3,163	278	585	486

<sup>1</sup> 2,428 pheasants, 2,338 ducks, 525 geese, 43 quail, 2 deer.

<sup>2</sup> 2,968 pheasants, 2,786 ducks, 597 geese, 202 quail.

<sup>3</sup> 4,516 pheasants, 3,134 ducks, 444 geese, 140 quail, 4 swans, 3 deer, 4 squirrels.

<sup>4</sup> 1,420 pheasants, 2,066 ducks, 509 geese, 21 quail, 3 ruffed grouse, 5 deer.

<sup>5</sup> 701 pheasants, 918 ducks, 396 geese, 2 deer.

<sup>6</sup> 723 pheasants, 1,053 ducks, 421 geese, 3 deer.

<sup>7</sup> 631 pheasants, 1,149 ducks, 400 geese, 2 squirrels.



### FISH AND GAME DISTRIBUTION.

No radical changes were made in distribution methods. The plan of using the rearing stations as centers of distribution, each for its particular locality, and the increasing distribution by truck, is being steadily developed. More and more individuals and associations are being encouraged to call at the hatcheries for stock, both of birds and fish. Much of the fish distribution from the hatcheries to near-by points was accomplished by the use of 5-gallon cans, of which several can be conveniently carried in a small touring car. All this means reduced transportation costs, less service of attendants, and far less loss of valuable stock in transit by reason of shorter trips.

Particular attention was given to the reduction of the losses of fish in transportation, realizing that a shipment of fish represents a large expenditure of labor and money over a long period of time to produce them, and is of too great value to be lost through improper handling.

Distribution facilities were increased by the addition of 500 cans, which enabled the stations to keep their stock moving with fewer of the tie-ups suffered in past years through failure of consignees and railroads in returning cans promptly. Distribution by truck has brought an appreciable reduction in the money loss of past years represented by unreturned cans.

The cost of fish distribution was \$3,507.37, as against \$6,995.72 in 1920. Of this, \$2,543.40 was for messenger expenses, \$923.75 for teaming, \$32.39 for ice, and \$7.83 for miscellaneous expenses.

There were no white perch, pike perch or smelt distributions this year in the absence of funds to finance the work.

The experimental planting of eyed trout eggs in feeder brooks was continued, and 877,000 eggs planted in selected streams in all parts of the State. We are well satisfied with the results. It is true that plants in some streams were a partial or total loss, as when the flood water from a heavy thaw smothered the eggs with silt or washed them away; when, in another instance, the receding water left the eggs to freeze; and when, in another,

they were eaten by water insects. But in the great majority of cases the reports were good, running to the effect that in June the brooks where the eggs had been planted were full of young fish. While the unusual summer drought destroyed large quantities of fry, this was no fault of the planting method.

The history of one particular Hampshire County stream, stocked with eyed eggs in 1920 and again in 1921, which was entirely destitute of trout when the first plant was made, is particularly interesting as told in the report of the warden who made the plant and watched the stream:—

The brook has turned out some trout this year that were from  $6\frac{1}{2}$  to 7 inches in length, and this is the result of the eggs planted Feb. 24, 1920. There were no trout to be seen in the brook when the owner of the land and myself planted the first eggs in it in 1920. To-day there are fry in it and a great many fingerlings that will measure from 4 to 7 inches in length. The owner told me that he fished the brook last week [the report was made June 27, 1921] and caught 18 over the 6-inch limit. He is the only one that has fished the brook, as no one thought there were trout in it. The stream is not posted.

In addition to the experiment with eyed eggs, the plan of planting very small fry (surplus from our hatcheries) in the headwaters of suitable streams was inaugurated. The brooks were selected very carefully, and 360,000 fry from Sutton, 50,000 advanced fry and 239,000 1-inch fingerlings from Sandwich were planted. The wardens under whose direction the work was done were detailed also to follow progress. They reported that (except in certain streams that dried up entirely, resulting in total loss) the fry made good growth, and were seen later in the year as sturdy fingerlings.

No pheasants were purchased for liberation this year, the entire output being from the State game farms.

There were 1,073 white hares bought in Maine at a cost of \$1,279, with an additional cost of \$309.61 for transportation, and \$67.23 for material for crates.

It is a pleasure to acknowledge once more the courtesies granted by the several railroad companies over whose lines our stock is carried, and to the express companies which have shown a desire to co-operate in every way possible in the successful handling of crates of birds and animals to the various points of delivery.

*Game Distribution during the Year 1921.*

COUNTY.	PHEASANTS.			WOOD DUCKS.			QUAIL.			Northern White Hares.	TOTALS.		
	Eggs.	Young.	Adults.	Eggs.	Young.	Adults.	Eggs.	Young.	Adults.		Eggs.	Birds.	Hares.
Barnstable . . . . .	445	420	39	-	7	-	-	-	-	66	445	466	66
Berkshire . . . . .	675	474	38	-	-	-	-	-	-	96	675	512	96
Bristol . . . . .	510	538	46	-	-	3	-	6	-	96	510	593	96
Dukes . . . . .	-	-	-	-	6	-	-	18	-	54	-	24	54
Essex . . . . .	508	460	48	-	8	2	-	-	-	102	508	518	102
Franklin . . . . .	240	450	25	-	-	-	-	-	-	84	240	475	84
Hampden . . . . .	680	516	34	-	6	-	-	-	-	83	680	556	83
Hampshire . . . . .	970	508	33	-	-	-	-	-	-	72	970	541	72
Middlesex . . . . .	790	452	44	-	-	-	-	6	2	90	790	504	90
Nantucket . . . . .	-	72	10	-	-	-	-	6	-	48	-	88	48
Norfolk . . . . .	510	370	36	-	8	-	-	-	-	90	510	414	90
Plymouth . . . . .	690	436	44	-	28	-	-	-	-	102	690	508	102
Suffolk . . . . .	30	40	2	-	2	-	-	-	-	-	30	44	-
Worcester . . . . .	720	824	51	12	6	-	-	-	-	90	732	881	90
Out of State, fairs and experi- mental. Sold . . . . .	645	-	-	-	-	-	-	-	-	-	645	-	-
Totals . . . . .	7,413	5,560	450	12	71	5	-	36	2	1,073	7,425	6,124	1,073

*Fish Distribution during the Year 1921.*

COUNTY.	BROOK TROUT.				Brown Trout (Year-lings).	SMALL-MOUTH BLACK BASS.		LARGE-MOUTH BLACK BASS.		White Perch.	Horned Pout.	TOTALS.	
	Eggs.	Fry.	Finger-lings.	Adults and Year-lings.		Fry.	Finger-lings.	Fry.	Finger-lings.			Eggs.	Fish.
Barnstable	-	-	17,500	150	-	7,500	4,000	-	3,200	14,100	-	-	46,450
Berkshire	170,000	74,000	123,800	1,025	-	36,000	2,200	-	-	-	20,000	170,000	257,025
Bristol	50,000	-	93,250	305	-	15,750	13,225	-	-	-	-	50,000	122,530
Dukes	-	-	6,000	-	-	-	6,400	-	-	-	-	-	12,400
Essex	-	-	152,000	-	-	12,000	1,400	-	-	-	-	-	165,400
Franklin	40,000	-	121,000	2,265	-	-	4,250	-	-	-	20,000	40,000	147,515
Hampden	100,000	100,000	98,550	1,950	2,000	6,000	685	8,000	450	-	15,000	100,000	232,635
Hampshire	70,000	50,000	100,700	585	-	6,000	7,225	-	-	-	19,250	70,000	183,760
Middlesex	133,333	-	121,675	265	-	-	7,500	-	1,600	-	4,000	133,333	135,040
Nantucket	-	-	-	-	-	-	-	-	-	-	-	-	-
Norfolk	13,650	-	95,250	625	-	9,750	8,000	-	-	800	-	13,650	114,425
Plymouth	136,350	50,000	169,750	100	-	39,000	12,850	-	-	-	-	136,350	271,700
Suffolk	-	-	750	32	-	-	-	-	-	-	-	-	782
Worcester	163,667	136,000	149,495	725	-	-	2,800	-	3,375	600	25,000	163,667	317,995
Out of State and fairs	-	-	-	50	-	-	-	-	-	-	-	-	50
Totals	877,000	410,000	1,249,720	8,077	2,000	132,000	70,535	8,000	8,625	15,500 <sup>1</sup>	103,250	877,000	2,067,707

<sup>1</sup> Secured working in co-operation with the Cape Cod Fish and Game Association. See page 74.



**MARINE FISHERIES.****INSPECTION OF FISH.**

While the work of this office for the year 1921 has been productive of distinctively good results in some directions, the scope of operations was materially circumscribed by certain changes made in the fish inspection act in the process of consolidating the statutes into the General Laws, which became effective Jan. 1, 1921. By these changes, which were evidently clerical misinterpretations of the original act, and made without consultation with this office, it became practically impossible to prevent the sale of third-grade fish by retail dealers. One of the main purposes of the original law being to prevent fish of this grade (which is suitable only for preserving) from reaching the householder through retail markets as fish suitable for fresh consumption, it will be at once apparent how the work was handicapped along what would have been one of its main channels for effective operation. An effort will be made to have the law returned to its original intent at the coming session of the Legislature.

It developed, too, under an opinion from the Attorney-General, that the powers of the inspector of fish and his deputies for enforcement were considerably limited by the absence of sections giving specific authority for search and for condemnation of fish found unfit for food or held or offered for sale contrary to law. With these limitations unexpectedly becoming known it naturally followed that the effectiveness of the act was greatly impaired.

The activities of the inspector of fish and his deputies are now set forth in section 8 of chapter 21, and sections 74 to 82, inclusive, of chapter 94, of the General Laws.

In June, 1920, a permanent and a temporary deputy inspector of fish were added to the staff, — William H. Sullivan of Charlestown and Wesley J. Duggan of Roxbury, respectively. These were provisional appointments under civil service. Following a competitive examination the appointment of Mr. Sullivan was confirmed. After two and a half months of service in temporary capacity Mr. Duggan's services terminated on August 17.

*Work of the Deputies.*

From June 1 to November 30 inspections were made of 980 stores selling fresh or frozen fish in many cities and towns. The fish stores in each of the 38 cities and 19 of the towns were visited, and, while general conditions ranged from fair to good, much room for improvement was found. Many dealers were unacquainted with the law and regulations, and it was noticeable, too, that in many instances fish were being sold to the public by men whose knowledge of fish and what constitutes a good fish was, to say the least, quite limited. At every market visited, the law and its objects were carefully explained, and copies of the law, the regulations, and a plainly worded explanation of the law were left.

It was found that many meat markets were selling fish on Fridays, stocking up with fresh goods for that day, and working off any surplus on the following days, with the result that poor fish was reaching the consumer. The situation created by the flaw in the law which failed to prohibit retailers from having third-grade fish was met as diplomatically as possible with moral suasion and corrected in several instances.

Besides the State-wide inspections, the 44 stores on the Boston Fish Pier, as well as the 100 peddlers who resort there for their cart supply, were inspected at least once a week, and frequently more often. This weekly inspection was also given the 15 wholesale fish stores on Atlantic Avenue and the 12 carts which form a picturesque outdoor Saturday afternoon and night market on Blackstone Street, Boston. The inspectors noted improvement by both the peddlers and at Blackstone Street when it became evident to the proprietors that their inspection was to be regular and not spasmodic. Frequent inspections were made of the Boston retail markets. The public cold-storage plants were also inspected.

In every instance the deputies found hearty co-operation from the boards of health in the various cities and towns visited; indeed, inspections in several places were made at the request of the local boards, and beneficial, and, it is believed, lasting results obtained. Reinspections of stores were made in several cities and towns, and these generally showed conditions improved since the initial visit. With the present force it is



East side of Boston Fish Pier, showing schooner just discharged of her fish fare, steam otter trawler taking out a trip, and fish carts in which fish are conveyed from crafts to stores. Note the coverings on the carts to protect the fish from the sun. (Cut used by courtesy of Whitman, Ward & Lee, fish dealers, Boston Fish Pier.)



One of the stands at the famous Blackstone Street, Boston, out-of-doors Saturday afternoon and evening fish market.





possible to visit annually only little better than one-third of the nearly 3,000 markets selling fish.

*Blackstone Street Cart Conditions.* — Noticeable to those who have occasion to visit the locality is the condition of the carts which make up the Saturday afternoon and night Blackstone Street outdoor fish market in Boston. Every Saturday afternoon and evening since June a deputy inspector of fish has been on duty there, and after the law was fully and painstakingly explained to the stand proprietors, many of them showed their belief in the idea that better quality of fish would attract more trade by offering higher grade fish than formerly, and a very general improvement was noted. The deputy kept careful watch here, and at his suggestion many pounds of fish below the quality required by law were at various times discarded to the waste barrels voluntarily by the dealers. They were also induced to place awnings or covers over their outdoor stands in the interest of cleanliness. It is felt that continued inspection here will work for even better results, and it is planned to continue the supervision on each Saturday.

*Peddlers' Supply.* — Throughout the year every effort has been made to keep up to standard the fish products as sold to the people of Boston and vicinity by peddlers from carts. There are over 100 of these carts. They purchase their stock on Thursday afternoons from the dealers at the Boston Fish Pier. At times, and in some instances previous to inspection, the stocks purchased were not up to the required mark. A deputy inspector has been on duty at the pier every Thursday afternoon with this peddler "fleet." Suasion has been used here with good results, but, as in the case with the Blackstone Street market, it is a branch of the business which should be systematically followed up in order that the best results may accrue. These peddlers reach a trade mostly of hard-working people not in a position to patronize the higher-priced stores, and who should be given every protection the law affords, both as to price and quality.

*Cheap Salmon for the "Fourth."* — One single instance will serve to illustrate the worth of fish inspection. On June 27 the inspector was called by one of the largest fresh fish concerns on the Boston Fish Pier to inspect a carload of fresh salmon which had arrived that day from Quebec Province,

Canada, through a Montreal dealer, and intended for the Fourth of July trade.

The fish pier dealer stated that he had disposed of the carload of 127 boxes, weighing about 25,000 pounds, to various wholesale dealers on the pier, reserving 21 boxes for his own trade. On opening the latter he found the fish not in the first-class condition he expected. He turned the lot over to the inspector, giving him the services of three of his floor men. Examination showed that the fish had evidently been packed in snow or snow ice, which had entirely or almost entirely melted, and that considerable time had been consumed in making up the carload for shipment. It developed, also, that the shipment started in a refrigerator car, but arrived in an ordinary freight car. Every fish was inspected separately. Few if any were found in first-grade condition, many were of second-grade quality, good for food if quickly disposed of, many were fit only for smoking, and quite a number were unfit for food.

Furnished by the dealer with a list of the firms to whom he had sold the salmon, two deputies took up the task of inspection, meeting with no opposition, but assistance, at the stores having the fish. Every fish of every box was accounted for and inspected. The fish fit for food were quickly disposed of to markets in Boston and vicinity, and thus many were enabled to have a good Fourth of July salmon dinner at a very reasonable price, while the remainder of the carload, except the unfit for food, were expeditiously smoked.

But for the fish inspection law it is probable that the whole carload might have been sent to smoke, and thousands of families thus deprived of a good dinner at a comparatively cheap price. On the other hand, some of the third-grade and unfit fish might have fallen into not too particular hands and sold at prices above which their quality warranted.

From the time of inspection at the pier the two deputies covered the markets to which the salmon were sold on each day up to the Fourth of July to see that the fish were in suitable condition for food.

Of the shipment of about 25,000 pounds, 2,817 pounds were sent to split and smoke as third-grade fish; 2,007 pounds were dumped as unfit for food, and the balance, as noted above, was sold as second-grade fish.

*Inspection of Producing Points.*

Besides covering the "shack" situation at Gloucester, the inspector of fish personally made a survey of fish conditions on Cape Cod, taking in Provincetown, Truro, Chatham, Hyannis and points between; also Nantucket, Vineyard Haven, Edgartown, New Bedford and Rockport, — all producing points. Visits of general oversight were also made in Boston and several of the large cities to observe conditions, in all, numbering some 125 inspections. Besides this, the office routine was kept up and numerous complaints investigated.

*Improving Quality of Splitting Fish.*

Feeling that under the fish inspection act there were grand opportunities for accomplishment in a large way for the benefit of the fish-consuming public and the wholesale fish dealers at the same time, the inspector of fish took up one idea, — that of improving the quality of some of the "splitting" fish, so called; that is, the fish that, by splitting, salting, skinning and boning, becomes the salt fish that is shipped all over the country in from 1 to 40 pound packages, and also exported in "drums," the basis of the "salt-fish dinner," the staple meal, for which some 20,000,000 to 35,000,000 pounds of fresh fish are landed annually at the great curing and shipping plants at Gloucester.

During several recent years there were landed many millions of pounds of fish, especially in the warm weather months, of what were termed "third-grade" fish, in capacity vessel loads, often poorly and insufficiently iced, but still considered suitable for the splitting and salting previously mentioned. During the war, when greatly increased production of fish was necessary for export to meet the greatly increased demands of some of the allied nations, and also for home consumption to replace the wheat and beef sent across to the allied armies, highest quality was of necessity at times almost lost sight of in the efforts to keep up the extra-quantity production so sorely and imperatively needed. The sudden signing of the armistice found unusually large stocks on hand, and the following season's large catch also was landed practically in "war condition."



In consultation with most of the large Gloucester dealers the inspector of fish found them all alive to the value of improving the quality of splitting fish landings, and ready and willing to accept the assistance of the inspector in putting their fish product on the highest quality plane. Captains and fishermen were also interviewed. They, too, sensed the fact that to continue as during the war was to invite possible serious consequences to the welfare and future of the industry, and were outspoken for action. The Fishermen's Union, through its leading officials, also favored close inspection of fares; and thus, with dealers, captains and fishermen agreed that something should be done, and all feeling that adequate fish inspection would work not only to their own benefit, but that of the fish consumer, this office continued its endeavors along the line first planned.

Following several consultations with the Gloucester Fish Exchange, which includes practically all of the fish shippers and curers of the port, and also with officials of the Fishermen's Union, this office on March 21 sent a letter to the Gloucester Fish Exchange setting forth the situation and asking co-operation. This, and several consultations between the Gloucester Fish Exchange and the inspector, resulted in the following regulations being issued by the Exchange, copies of which were sent broadcast to the trade and throughout the New England fishing fleet: —

GLoucester, Mass., April 12, 1921.

*To Masters and Crews.*

GENTLEMEN: — The undersigned dealers of Gloucester again find it necessary to advise with the masters and crews concerning the cure and handling of fish.

We have a letter from the State Inspector of Fish, copy of which is attached, calling our attention to the necessity for improving the quality of our product. He expressly calls our attention to the necessity for co-operation with his Department to the end that the standard of splitting fish may be improved.

NO FRESH EASTERN FISH AFTER MAY 1.

Realizing the necessity for improving in so far as possible the quality of the fish produced, we must insist that the following rules be carried out. Inasmuch as the greater part of our troubles are due to the bringing



in of so-called "shack" fish during the summer months, we have agreed that hereafter we will not buy the fare of any vessel that sails from Gloucester or Boston on or after May 1 on an eastern shacking trip. Therefore it is necessary that all vessels going to the eastward on or after May 1 until October 1 carry salt and bring in their whole trip salted.

#### SALT FISH MUST BE WHITE.

We must also call your attention to the necessity of having the fish dressed shortly after being caught and before they are sun-cooked; also that plenty of clean water be used so that the fish will not have blood stains, and also that plenty of salt be used to prevent taint and to secure that "white color" which the trade demands.

In past years when we had a good export business we could use fish that were not quite so white as are needed for the domestic business, but as there is very little prospect of getting back the foreign trade, all the fish that we will take in must be suitable for domestic purposes. It therefore becomes necessary that fish be well split, washed and well salted in order that we may have a product that will enable us to compete with other markets, and build up a business in Gloucester which will be profitable to all concerned in the industry.

#### WESTERN FRESH FISH MUST BE NEW.

A western trip of fish must be gilled and thoroughly iced. In fact, fish landed to splitters must be of market quality to receive full splitting prices. Buyers are cautioned against taking out of ice more fish than can be split and salted in the day's work, and crews of vessels are urged to help the situation by working on trips when requested in order that all fish may be handled when in the best condition.

In order to encourage the kindest feeling between the buyers and the fishermen, and to avoid dispute in connection with the quality or a fair and proper price for the whole or any portion of a trip, and if a difference of opinion arises, which cannot be satisfactorily adjusted between the buyer and the seller, the former will call in three disinterested buyers, who shall, without charge, state what is a fair price for the fish in question.

GORTON-PEW FISHERIES COMPANY.  
DAVIS BROTHERS FISHERIES, INC.  
P. J. O'BRIEN & Co.  
PARKHURST FISHERIES COMPANY.  
GLOUCESTER SALT FISH COMPANY.  
FRANK C. PEARCE COMPANY.  
FRANK F. SMITH & Co.  
WM. H. JORDAN COMPANY.  
BOOTH FISHERIES COMPANY.  
HENRY E. PINKHAM COMPANY.  
CHARLES F. MATTLAGE & SON.

On the whole, the plan worked out well, and the captains generally showed a disposition to live up to the Exchange provisions, and not since the "shack" fishery was first engaged in has there been landed such a generally fine quality of fish for a whole summer season.

Trips were made in shorter time, from a week to ten or twelve days being the average, and the crafts brought fares of from 70,000 to 125,000 pounds. The crafts carried generally from 30 to 40 tons of ice to care for their catches, as compared with the fact that the shack trips of recent previous summers were generally three weeks or more in length; that the fares brought in ranged from 150,000 to well over 200,000 pounds; and that but from 12 to 25 tons of ice were carried by many of the craft.

It should not be assumed that the plan worked out perfectly. It is a fact that a few "eastern" trips "got by," and that some fish below the very high standard set reached the wharves, although few if any on a par with the third grade of the past few summers reached the knives of the splitters. It also developed that some trips from the eastern grounds, caught in quick time and well iced, were landed in good condition.

With reference to this co-operative move at Gloucester it may be said, on the authority of some of the leading Gloucester dealers, that the edict above quoted, published in all the leading Nova Scotia and Newfoundland papers, had the effect of causing the fishermen and firms at the fishing ports there to take extra care of the fish intended for American consignment, with the result that their salt fish came through to the American market generally in better condition than in the previous few years. It also had a good effect on the summer landings at the Boston Fish Pier, there being no need at any time during that period of looking to eastern-caught fish to supply the market. The receipts from the Banks to the westward of the 66th parallel of longitude were steady, constant and of greater volume than usual, and the fares caught in brief time, which insured fish in the freshest and newest state possible.

*Recommendations.*

In closing, the inspector feels it his duty to make three observations: —

1. The law, which was framed with the intent of protecting the fish-consuming public and the honest dealer, needs strengthening to the extent of giving the inspector and his deputies definite powers as to the right of search, seizure and condemnation. A few sections should also be revised to admit of but one clear, definite interpretation.

2. With nearly 3,000 establishments handling or selling fish, it is evident, in order to insure a maximum of efficient enforcement and to give the fish-buying public the full measure of protection intended by its framers and set forth in the various sections of the act, that a larger force of deputies is needed. At present there is but one deputy in service, and one temporary deputy was employed for less than three months during the summer — all that the appropriation for this work permitted.

3. In its annual report to the Legislature for 1921 (House Bill No. 1260) the Special Commission on the Necessaries of Life made the following recommendation: —

9. One of the great assets of the Commonwealth is its fisheries. They should be the source of much excellent and low-priced food. At present they are in a precarious condition and should be rehabilitated and encouraged to their fullest extent in order that the people may receive the full benefit of this great natural food supply. The Commission therefore recommends that a thorough study be made of our fisheries in regard to production and distribution of their products.

The above statement cannot be too strongly endorsed and corroborated. It should be taken most seriously and deserves definite and immediate action in the interest of public welfare.

**THE FISHERIES COLLEGE.**

The “fisheries school,” so long talked of, has become an actuality, for a course in fisheries engineering has been provided at the Massachusetts Institute of Technology as a result of the meeting in Boston of interested persons with Prof. John



N. Cobb, Director of the College of Fisheries of the University of Washington. The idea of a fisheries school, or fisheries course, as presented to Professor Samuel C. Prescott of the Department of Biology of the Massachusetts Institute of Technology by a subcommittee of the initial gathering (comprising President Gardner Poole of the United States Fisheries Association, John C. Wheeler and Russell Palmer), fell on fertile ground, and as a result the course in fisheries engineering was opened at the Massachusetts Institute of Technology in October. The course has had the approval of the Federal and State fisheries authorities and the general fisheries interests.

The Bureau of Fisheries will detail experts to aid in instruction, and fisheries men have aided in a financial way. This Division has asked in the annual budget for \$3,000 to aid in securing competent instructors.

The importance of our fisheries as a national asset has for many years not been as fully recognized as the subject merits. While one of the results of the war was to call the attention of Americans to the high value of fish foods as sources of energy, and to the advantage that could be derived from the consumption of more fish and less meat, we are still far below other nations in the per capita consumption of this type of food, and persist in failing to take full advantage of these great storehouses, — the oceans, the Great Lakes and our smaller lakes and streams. To cultivate these vast sources of food supply, to protect them from the harmful effects of sewage contamination and manufacturing waste, and to make it possible to distribute these highly nutritive products throughout the country has now become public duty. In this, educational institutions should take a part. Now an opportunity is offered of undertaking studies in a new and interesting field, to which the name of "fisheries engineering" may be given. When it is borne in mind that the fishing industry was for decades one of the fundamental industries of America, and second only to agriculture, and that it still ranks very high in our productive enterprises, it may properly be regarded as a field to which the aids of applied science and technically trained men should be directed.

It may be claimed justly that here is an industry of enormous magnitude and still greater possibilities which has received



almost no attention except through the work of the Bureau of Fisheries at Washington and the conservation commissions or departments of a few States, whereas all branches of agriculture, stock raising, forestry, oil production, mining, and other industries based upon or utilizing the great natural resources, are being fostered and aided by a large number of agencies. Let it be recalled that every State has at least one college of agriculture and one experiment station or more, all devoting time and money to help the farmer, the fruit grower or the stock raiser in the solution of his problems. Let it be remembered that at least a dozen schools of mining exist, even in States having no important mineral wealth, and many more are attached to technical schools and State universities. Similarly, and still more directly comparable with the fishing industry, schools of forestry have sprung up in considerable numbers, the aim of which is to aid the lumber industry, save the forests from depletion by unintelligent methods, conserve the timber supply indefinitely, and apply science to what was formerly done "by rule of thumb."

The training essential for men of this type, who will eventually become leaders in a great basic industry, must be broad as well as practical. As good citizens and men of affairs, they must have general as well as specialized knowledge. Hence the course of study which they follow should be strong in general studies, such as English, economics, mathematics and chemical and physical sciences. In the specialized fields there are certain lines of prime importance. Obviously, the first to be considered is the biological, for the men must know much about fish, their habits, their enemies, their foods, their breeding peculiarities and their life histories. Since the fish are to be frozen, dried, canned and preserved in various ways, as well as sold fresh, knowledge of the causes of spoilage and deterioration is essential. This involves a thorough study of microbic life or bacteriology, and, parallel with this, studies in organic chemistry and bio-chemistry. As the preservation of food materials by refrigeration, dehydration, salting, smoking or canning is based in every case upon the destruction or inhibition of bacterial life, the technology of fishery products is in part a biological matter. It is in part, also, a matter of methods and

machinery, hence the fisheries engineer must have a sound fundamental training in mechanism, in the type of engine he is likely to have to use, and in its proper control. Under the subject of heat engineering he acquires training to meet these demands. The mechanical and engineering subjects, therefore, comprise a second group. Navigation may also be included here.

A third group of subjects deals with the economics of the industry, with its industrial relations, and with general business administration. Accounting and cost accounting, statistics and their collection and use, industrial organization and business management, and business law supply the needed fundamentals in this field. Under the general subject of business management will appear such important matters as transportation, publicity, marketing, sales management and the many other phases of activity of a properly organized industry. A group of subjects bearing on public and personal hygiene and plant sanitation equips him for this phase of his future work.

The course in fisheries engineering, as it has thus been briefly and roughly characterized, is comparable with the other four-year courses offered at the institute and leading to the degree of Bachelor of Science. The requirements for admission to the course are the same as for the other professional courses, and its satisfactory completion stamps the man with a professional attainment of as high standard as the training in the older courses, such as civil or mechanical engineering, or chemistry or architecture.

#### NATIONAL FISH DAY.

March 9 was generally observed throughout the country as National Fish Day. This idea was conceived by the United States Fisheries Association, of which Gardner Poole of Boston is president. It had the earnest support and endorsement of the United States Bureau of Fisheries, and at the request of President Poole, the Division of Fisheries and Game gave all assistance possible in bringing it to the attention of the people of the Commonwealth. The purpose of the day was not to increase the sale of fish for one day, but to direct the attention of the public to the fisheries as an industrial resource that far

too long has been neglected, and to raise the plane of the business to the level of other lines of food supply.

Wide publicity was given through the press. Fisheries articles, slogans and poetry urging the eating of more fish were prepared by this Division and were used extensively by the fish dealers and the newspapers throughout the country in calling the attention of the public to the day. Representatives of the Governors of the various New England States were invited by the Division of Fisheries and Game to meet in Boston on that day and consider plans for increasing the consumption of salt-water fish.

In Boston the day was made one of large concern by the fish dealers generally. A fish banquet at the City Club, under the auspices of the Rotary Club, was followed by a discussion of fisheries matters in general at a meeting at the Hotel Somerset in the afternoon, and the day closed with a fisheries banquet at the same hotel in the evening. The Commissioner of Conservation and the Director of Fisheries and Game and inspector of fish were in attendance and spoke at these meetings.

#### FEDERAL CONTROL OF MIGRATORY FISH.

The control of migratory fish has been discussed off and on over a period of years. The success attending the migratory bird treaty and the Migratory Bird Treaty Act has renewed the interest of many people in the possibilities of a Federal law controlling migratory fish. It is a subject which appeals to the popular imagination, but it is fraught with many more problems than the control of migratory birds. The moving factors to-day in favor of such control are the Camp Fire Club of America and a committee appointed by the American Game Breeders' Association at its annual meeting in New York in January, 1921. Their activities have been ably supported by newspapers scattered throughout the country, and many individuals and organizations.

The plan of such control was discussed at a meeting held at the Department of Commerce in Washington, D. C., June 6, 1921. This conference was presided over by Secretary Hoover. At the close of the deliberations the following resolution, among others, was passed:—



*Be it further resolved,* That on the question of general Federal control of the migratory fishes we make the following recommendation:—

That the Department of Commerce call from time to time conferences with the Governors of various States in conjunction with the State fish commissions, with the view of suggesting uniform legislation by the various States for the protection of such varieties of migratory fish as may be threatened with extinction through pollution or any other causes.

In the light of the foregoing action, and investigations carried on in various directions, the committee selected at the meeting of the American Game Breeders' Association (which committee is spokesman for the Camp Fire Club of America) has considered it advisable to first direct its efforts toward reviving the treaty between the United States and Canada with reference to the fish of the Great Lakes, expecting, in the event of a successful conclusion of this matter, to take up next the question of the control of salt-water fishes.

In the meantime it is planned to advocate certain remedial measures to be taken by the several coastal States, in conjunction and with the assistance of Federal agents, to see how far the States, by co-operative study and action upon the problems, can show there is no need for Federal control. The Commonwealth was represented at the conference of the Department of Commerce by Fish Inspector Millett, and at the deliberations of the committee above referred to, by Director Adams, who is a member. Director Adams also represented the Department at the conference of the United States Fisheries Association, held in Atlantic City in September, at which various phases of the discussion were covered. At that time our commercial fishermen volunteered to propose State legislation looking to the prohibition of the possession and sale of certain salt-water species under a given length, and in all probability spike mackerel and small bluefish and small butterfish will be included in the list of protected species.

#### THE FISH INDUSTRY.

In order to give a first-hand view of the fisheries of the State this Division has enlisted the aid of well-known leaders in the various branches of the fish business to give briefly their com-



ment on the fish year just closing as seen through their business eyes.

Thomas J. Carroll, general manager of the Gorton-Pew Fisheries Company of Gloucester; Gardner Poole, President of the Commonwealth Ice and Cold Storage Company of Boston; John C. Wheeler of the Bay State Fishing Company of Boston Fish Pier; and Irving M. Atwood of the Freeman & Cobb Company and Consolidated Weir Company of Boston Fish Pier, have contributed to this symposium.

*Believes Submarines affected Traps' Catch.*

Writing on traps, weirs and freezers, in which branches Cape Cod predominates, Mr. Irving M. Atwood states: —

It would seem at the time of writing this that the traps on Cape Cod would not fare any better this year than they did last, and the same is undoubtedly true of the freezers. This is indeed unfortunate as regards the traps, for apparently there was in our waters last year a large body of mackerel and other marketable fish which, if the traps had caught, undoubtedly would have brought large revenue and prosperity. This is evidenced by the fact that almost every day during the summer our traps in Provincetown and vicinity caught a few mackerel, maybe 50 pounds, maybe three or four barrels. We do not remember a year when we caught mackerel so steadily from day to day as we did last year.

Why we did not get larger quantities we can only conjecture, but we are of the strong and firm opinion that the reason is due to the activity in Provincetown Harbor and Cape Cod Bay of the submarines. Almost the entire summer there were many submarines at the Provincetown base constantly maneuvering in the harbor and bay. There were a few scattering days when they were not there, and on those days we caught large quantities of fish as compared with the catches on the other days.

It seems to us too bad to have the largest industry and activity in Provincetown ruined by the maneuvering of the submarines. The condition that applies to mackerel applies also to all the fish that we catch, and in consequence we did not get, by a large percentage, as many fish to freeze this year as last, which in turn was a small year. It seems to us highly important that this question of the use of Provincetown for a large naval base, with the consequent activity of submarines and other vessels, should be thoroughly investigated and the base changed elsewhere, as we feel that it is extremely detrimental to the fishing, — one of Massachusetts great industries.

This year we fished two more bowls or pounds than last year, and find that up to November 1 the comparative stocks are as follows: 1918, 55,367; 1919, 55,001; 1920, 31,976; 1921, 37,013.

As regards the freezer we find that the amount of fish frozen this year is less than any of the amounts frozen the last four years, and is as follows: 1918, 2,245,335; 1919, 1,757,636; 1920, 1,268,474; 1921, 750,620.

We think that the condition in our traps and freezer is typical of the general conditions on the Cape.

*Refrigeration aids Dealer and Consumer.*

Mr. Poole contributes the following on refrigeration as applied to the Massachusetts fisheries:—

To the modern fish man, be he producer, wholesaler or retailer, the subject of cold storage is important.

Every producer, large or small, at certain times is either directly or indirectly affected by the functioning of cold storage or its lack. If it functions properly it helps to make a market during the inevitable glut for the surplus catch which could not be absorbed for immediate consumption in the fresh state. If it were not for modern cold storage there would unquestionably be times when the fisherman would feel that his efforts to earn a living in the production of foodstuffs were futile. Each and every producer may not realize this where his contact with freezing is indirect, but he would if he took the trouble to trace his catch through trade channels to the consumers' tables.

As for the wholesaler, without exception he knows all of the above and the tremendous economic loss possible without efficient cold-storage service.

And with Mr. Retailer, the boon of cold storage is being better realized every day. The progressive fish merchant with his cleanly white tile store, neat, white-aproned clerks, attractive displays, etc., knows and uses the advantages of direct contact with cold storage. In order to keep his customer supplied with all varieties of fish, both high and low priced varieties, throughout the year, he either arranges with his wholesaler or protects himself direct with the warehouseman, providing during the season of plenty for the season of scarcity. He also knows that without cold storage not only would the economic waste during periods of glutted markets be heavy, but that prices during off seasons would be prohibitive to trade. To-day, even the smallest retailer is beginning to appreciate the natural laws on which cold storage operates, and that without it he would be many times temporarily out of stock and out of business, which would result in increasing his annual overhead and necessitate adding a larger margin of profit on every sale during the season of fresh production.

Outside of the trade, it is surprising to discover from what different viewpoints the subject of cold storage is considered, and those are found who would abolish the entire system, regarding it merely as an unnecessary evil, whose existence works no good to any one except the man who would extort inordinate profit from the great consuming public. Those who hold such views and cannot see that cold storage has become a great

public necessity must be put in the same group with those who could get along just as well in this world without applied electricity, the telegraph and telephone, steam and electric transportation, modern sewerage and dozens of other vital instrumentalities upon which civilization to-day depends and upon which our economic and social structure rests.

Never, to the knowledge of any one, has anybody been injured by cold storage, but only by the lack of it.

Regarding actual holdings of fish in cold storage, analyzing and comparing the latest available reports it is found that the United States holdings as of Oct. 15, 1921, were about 58,000,000 pounds as compared with about 64,000,000 pounds a year ago. This shrinkage of 6,000,000 pounds is comparatively small and does no more than represent the usual amount of annual fluctuation between normal years. It is largely accounted for in the whiting holdings, which are slightly more than 5,000,000 pounds under last year.

Massachusetts' share of the above totals was, on Oct. 15, 1921, about 15,000,000 pounds, a shrinkage of approximately 3,000,000 pounds since the corresponding date of 1920, when the figures indicated about 18,000,000 pounds. Likewise, this local decrease is not abnormal and is primarily due to a decrease of a like amount in whiting holdings.

This year's subnormal whiting run, due to reasons beyond the control of man, such as weather, wind, tide, habits of the fish and the distribution of feed along our shores, accounts for a national decrease as compared with last year of about 5,000,000 pounds, and Massachusetts, as the leading whiting producer, accounted for 3,000,000 pounds of that decrease.

With the exception of a light herring run, production and storage of other varieties during 1921 were practically normal.

The cold-storage and fisheries industries of this State are in a healthy, gratifying condition. They both came through the war in unusually good shape and are in a position to serve the citizens of the Commonwealth to a steadily increasing degree.

The fishing industry in particular has shown a highly commendable desire to help itself through inspection and co-operative effort. The United States Fisheries Association, the only national fish trade organization, of which I happen to be president, has established executive offices in Boston, and is functioning well on the larger problems requiring co-operative effort.

The future of Massachusetts fish and cold-storage interests is bright.

### *Fresh Fish Dealers Hopeful.*

Mr. Wheeler writes: —

As the year draws to a close, the fresh-fish industry reports progress in its various activities.

The receipts of fresh fish landed at Boston will exceed 110,000,000 pounds for the calendar year, a decrease of some 10,000,000 pounds against



1920, and as this total represents 400 more trips than in 1920, it is evident that the vessels made shorter trips and landed smaller average stocks for the fresh-fish market, indicating better quality.

The buying of fresh fish for salting at Gloucester was greatly diminished and this had a direct influence on the operations of both the sailing fleet and the trawlers, who were obliged to conduct their operations almost exclusively for the fresh market.

Another reason for the decrease in tonnage was the absence from the market of the trawlers during March and April.

Selling prices were low during the greater part of the year, due to much reduced costs of all items of operating expense, including coal, ice, food, nets, oil, repairs, labor, etc.

The readjustment of labor, in line with other industries of the country, has been accomplished during the year. On March 1, 1921, the wartime wage agreements of trawler workers expired. Great efforts were made by the trawler owners to bring about a reasonable decrease in wages without interruption of operation. After repeated meetings with the representatives of the various unions during the early part of the year, and the formation of a joint conference council to handle the situation, March 1 arrived and all trawlers were tied up, due to the refusal of the fishermen to accept the new scale proposed by the owners. This situation continued until May 1, when the largest trawler company, after due notice, started operating trawlers on an open-shop basis, and has continued on that basis throughout the year, followed later by other trawler companies.

As the joint conference council was committed to principles of arbitration, continuous operation and cordial relations, the stoppage of the trawlers rendered further meetings useless.

No failures have occurred among the Boston wholesale fish dealers during the year, which further indicates the fundamental stability of New England's oldest industry.

An event of great importance to the industry was the active support and co-operation during the year by the Secretary of Commerce, Hon. Herbert Hoover, who called several conferences of representative men of the fish industry and projected plans and named committees with a view to solving problems vital to the business. Prominent among these subjects were lower transportation rates and lessening of pollution of coastal streams and waters.

The entire commercial industry is gratefully indebted to Mr. Hoover for his interest and support and his appreciation of the importance and magnitude of our fisheries.

As the potential production of the New England fisheries is far greater than the present consumption, much attention is being given at the present time to new methods of preparation and distribution of fresh fish. The most popular method is that of cleaning and boning fish, wrapping in parchment, ready for the pan. Several companies have made marked progress in this direction, each differing in detail in some slight degree,



but all striving for a fresh, clean product, wrapped and ready for the housewife, and attractive to retail grocers, through whom it is intended to effect distribution in a large way. We stand at the threshold of a new era in the preparation and distribution of fresh fish, and Massachusetts, as the greatest fishing State of the United States, will lead the way.

*Fleets generally operated at a Loss.*

In a general review of the catching and distributing ends of the industry, Mr. Carroll writes: —

Looking back over the past year in the fishing industry one must admit that the results have been very unsatisfactory. From the production standpoint the only profitable part of the industry was the fresh halibut fishery.

The vessels engaged in the halibut fishery had a very successful season due to good catches and good prices. The price of fresh halibut during the season was very satisfactory to the men on the vessels and also to the owners.

The mackerel fisheries started out well and the fishermen were looking for a good season, but after the middle of June, the time the fleet arrived from the Cape shore, the fishery was a complete failure, the worst in the history of the business. The mackerel seemed to have disappeared completely from our shores, so that after an unsuccessful operation of several weeks it was practically abandoned for the season. This was indeed a great blow to the vessel owners and to the men, inasmuch as the mackerel fishery is generally a very profitable one for all concerned.

The haddock and the so-called "shack" fisheries were very unprofitable, this being due to the extremely low prices paid for fresh fish during the greater part of the year. It is safe to say that the vessels operated at a great loss, and the men engaged in the fisheries did not make living wages.

Fundamentally the trouble with the industry is that it has been operated to a great extent on post-war costs and selling its product on a pre-war basis.

I am pleased to state that great progress was made in the past season in improving the quality of fish landed from the vessels. In this connection we have had the hearty co-operation of the fishermen in our efforts to produce high-quality products, which, together with the valuable assistance we received from your inspector of fish, Mr. Millett, has resulted in a wonderful improvement all along the line. In this co-operation and desire of all connected with the industry to produce nothing but the very best fish, we see one of the most hopeful signs for the future of the industry.

Several of the captains of our mackerel fishing crafts have stated that having seen such large bodies of very small mackerel this past year they

are very hopeful that the coming season will be a good one in that industry. I feel that with the return of better conditions in other lines of industry there will be a better demand for fish the coming year, with the result that the vessels and the fishermen will receive better prices, and thereby be in position to get fair returns on money invested on the part of the owners, and reasonable compensation for the men who risk their lives every day that they are on the fishing banks.

#### THE DEEP SEA FISHERIES.

The fish landings by the fleets of Massachusetts crafts engaged in various fisheries conducted all the way from Cape Hatteras to the Grand Bank of Newfoundland are less in volume than for the previous year. Prices generally of fares from the vessels ruled much lower than in 1920. These two factors, taken in connection with the fact that the cost of production was not reduced in proportion to the fall in prices, and that gluts of fresh fish were frequent at the Boston Fish Pier by reason of under-consumption caused by post-war conditions, made the fishing year one not pleasant to look upon, either from a financial or large catch standpoint. In some respects the year, viewed from either the standpoint of the dealer or the fisherman, has been one of the poorest in a long time. Adverse trade conditions, the rate of foreign exchange and the ratio of the cost of production to the prices received all combined to make the year one that, generally speaking, fish dealers and fishermen alike would be pleased to forget as soon as possible.

True, there were some bright spots. Without question there was a marked improvement in quality of fresh fish landed during the warm weather months; a few of the fleets fared extra well; during the fall a gratifying increase in trade in salted fish is noted. Stocks on hand are light as compared with the preceding five years, and this augurs well for a clean-up of goods on hand during the winter and spring, leaving a bare and active market to receive the spring trips, with the possibility, through livelier demand, of better prices. The fresh-fish market has not responded to any very noticeable increased demand up to date, but the dealers are confident that with the advent of real winter weather their product will be in less receipt and greater demand, with correspondingly better prices.

*Fresh Fishing or Haddock Fleet.*

The fresh fishing or haddock fleet had a very open winter on the fishing grounds which made for large catches. The prices generally were lower than the previous year, and at times fresh fish were positively a drug on the market. Several Nova Scotia sailing crafts and steam trawlers landed their catches at the Boston Fish Pier during the winter and helped to swell the total figures. The volume of trade was too small to absorb all the fish brought to the pier, and many fares went to the splitters, thus showing the general poor condition of the market even during the winter.

It should be noticed that on January 27, with 16 crafts arriving with less than 1,000,000 pounds of fish, haddock sold at \$1.50 per hundredweight. On February 2, with but 378,000 pounds in receipt, haddock sold for \$1.25 and codfish at \$3 per hundredweight, and on that day one of the crafts of the steam trawling fleet was obliged to bring her fare of 110,000 pounds to Gloucester to the splitters, there being no demand for the fare for fresh consumption. Again, on February 8, with landings of but 465,000 pounds, and this only one day before the opening of Lent, fresh fish reached the lowest price of the winter at the Boston Fish Pier, haddock selling at 75 cents per hundredweight, and codfish at \$2 per hundredweight. On March 1 the wage plan under which the steam trawler fishermen had been working by award of a special arbitration board expired, and as fast as the steam trawlers arrived they were hauled out of fishing, the owners claiming it was not profitable to run them longer under the wage award. There were no ultimatums issued either by the trawler owners or the Fishermen's Union, so it was not a question of a strike or lockout by either party, but simply a matter of business necessity, as neither capital nor labor under the conditions at that time had a market for the goods that the other offered. In bringing about this situation, poor prices of fish to the producer and high cost of operation, aside from the matter of wages, played their part.

Even at present, only a part of the steam trawler fleet of Boston and Gloucester are operating, and this in spite of the fact that the wage schedule is much lower than that which



expired on March 1. The disproportionate ratio of cost of production and low prices for the catches still obtain. During the summer the fresh fishing fleet as a whole was larger than usual, caused by the fact that few, if any, vessels engaged in "shacking," that is, catching capacity trips, poorly iced, exclusively for the splitting market, on the Banks to the eastward of Cape Sable. The majority of vessels fished on the Banks to the westward of Cape Sable, and the summer season was marked by a continual stream of fares of market size, in prime condition. This the limited demand of the summer market for fresh ground fish was not able to in any way absorb, and in consequence the bulk of the catches went to the splitters. This fall the season shows little change for the better. Prices are ruling low, catches are good and the trade is light, although at this date, November 30, there are signs of increased demand and stiffer prices.

An interesting picture of the part which the rate of exchange plays in the fish business is illustrated by the landing, during the winter at the Boston Fish Pier, of a goodly number of fares by Nova Scotia vessels and steam trawlers. These crafts with fewer men in their crews, with cost of operation much less, and with the added advantage of the rate of money exchange in their favor were able to make profitable trips, while American vessels of the same size were actually out of luck and pocket on fares of the same size and sold on the same market.

The hauling out of the steam trawler fleet around March 1 caused a gradual decline to manifest itself in the figures of the fish landings in the weeks following.

Up to March 4 the Boston Fish Pier record shows there had been 494 arrivals since January 1, with 24,289,250 pounds of fish as against 385 arrivals with 20,740,595 pounds in the year 1920. By March 26, less than a month after the steam trawlers hauled out, this 3,500,000 pounds' advantage over last year had been lost, and the total receipts were on even terms with those of the year previous at that date. On October 7 receipts of the year from January 1 at the Fish Pier were 10,000,000 pounds behind those of last year for the same period, and on November 30 the fish landing deficit there for the year as compared with the year previous was 12,000,000 pounds.



*Swordfishing Fleet.*

The swordfishing season of 1921 opened with the taking of three fish by a Block Island fishing craft 30 miles south of Montauk Point, Long Island, on June 10. On June 16, the schooner "Ralph Brown," which had been on a fishing trip to grounds about 100 miles from New York, and near the edge of the Gulf Stream, landed at Fulton Fish Market Pier, New York City, 5 fish which sold at the unprecedented price of 60 cents per pound. About June 20 small numbers of swordfish appeared on the southern part of Georges Banks, and gradually extended eastward to the southeast part of Georges in latitude 40° 40' north. At this time no less than 60 sail of boats, all of auxiliary motor power, were engaged in this branch of the fishery operating over an area extending from Block Island eastward to the eastern edge of Georges Banks.

The first fare of swordfish, 37 fish in number, to arrive at Boston this year was brought in by schooner "Actor" on June 30, and sold at 36 cents per pound.

During the months of June and July weather conditions were extremely unfavorable by reason of fog and rough weather, this resulting generally in long trips but small catches. It is estimated that in July the fleet engaged in swordfishing, both shore and off shore, numbered fully 100 sail. From August 1 to September 20 the fleet was widely scattered all the way from Block Island to Scatteri on the east coast of Nova Scotia, off which fish appeared in varying quantities as early as July 6.

From July 15 to September 20 fish were quite plentiful on that part of the Nova Scotia coast extending from Halifax to Scatteri, a distance of 190 miles. As this fishery was practically all within the 3-mile limit, American crafts were unable by reason of treaty restrictions to engage in it there. During the summer months large schools of herring and other bait fishes strike in from the off-shore banks all along this Nova Scotia coast. They are followed by the swordfish, the latter in many cases chasing the schools in the bays and harbors, so the Nova Scotia fishermen each year reap the rich harvest, shipping their entire catch to the American market. Their catch this year is believed to be the largest they ever made.

The Nova Scotia swordfishery is conducted chiefly in small boats, and landings are made daily, doing away with the expense of icing, and this reduces the cost of operation to a minimum. Their fishing is conducted almost wholly in territorial waters, and any infringement by the American fishermen is carefully guarded against; hence the need of protective tariff legislation.

Reverting to the swordfishing by Massachusetts crafts, the season as a whole fell far below that of 1920, which was the best on record. Not only was the catch smaller, but prices averaged lower. The swordfishery, taken as a whole, is fast becoming one of the most important summer branches of the fishing industry, swordfish being one of the few species of fish for which there seems an increasing demand. Twenty years ago the number of boats engaged was negligible as compared with the present large fleet of modern auxiliary powered crafts, and at that time 4 to 6 cents per pound was considered a fair price. To-day the market rarely goes below 12 to 18 cents a pound, and more frequently reaches from 20 to 22 cents.

There is no evidence that the number of swordfish is in any way decreasing upon our fishing grounds. In fact, it is noticeable, and in a way remarkable to find, that on the Grand Bank of Newfoundland, where only a few years ago the swordfish would have been regarded as a curiosity, they were commonly reported in abundance during the past summer, and the run was of extra large size. The catch of the 1921 season will not exceed 70 per cent of last year, and the average market price, ex-vessel, was from 18 to 20 cents a pound. The shortage of catch is due entirely to dense fogs and generally unfavorable weather conditions.

#### *The Mackerel Fishery.*

The mackerel fishery of 1921 will go down on record as the poorest for many years. Indeed, not in fifty years has the landing of salted mackerel been smaller. In 1910, 3,395 barrels were landed, as against 3,242 barrels this year. The catch of fresh mackerel, about 40,000 barrels, is a bit better than half the fresh landings of 1920. But few times since the seining landings of fresh mackerel began has the catch been less than this year.

Notwithstanding the fact that mackerel schools were sighted much earlier this spring than usual, and that the fleet got away at an unusually early date, the southern mackerel season will rank among the poorest in recent years. Following this un-auspicious opening of the season, the mackerel seiners repaired to the Nova Scotia Cape Shore in search of the migratory schools which annually frequent these famous fishing grounds, leaving the large fleet of small netting craft to pursue operations to the southward. The netters had several big fishing days, one of them probably the largest in the history of the mackerel netting fishery, but even this did not serve to make up the early deficit in the catch. The netters, while having what might be called a good season as a whole, did not approach their catch figures or financial returns of the previous spring, and the Cape Shore season opened with the total catch out south, on May 26, of 13,912 barrels fresh, as compared with 27,940 barrels at the same date, 1920.

Following this poor showing the seiners on the Cape Shore struck schools large and plenty, with the result that the Cape Shore season was, as far as fresh mackerel was concerned, the best since 1917, and almost equal to that year. The fresh Cape Shore catch totaled 2,176,000 pounds as against 1,290,000 pounds the year previous. The Cape Shore catch of salted mackerel was practically the same as last year, — 3,200 barrels as against 3,217 barrels in 1920. Following the Cape Shore trip the fleet repaired to the southern grounds and found but very few fish. Later the vessels scattered to all spots where mackerel had been found in the past, only to draw practically a blank. With the exception of a few small schools taken during the summer, the season after the Cape Shore was nothing more or less than a total failure and bitter disappointment to all engaged in this fishery.

A few interesting facts regarding the season will not be out of place here. As late in 1920 as December 13, when the mackerel season was believed to have been long over, the observer on the Nantucket Shoals Lightship wirelessly that mackerel were schooling off there and the weather was mild. On March 1 the steam trawler "Petrel," Capt. John Shea, arrived at the Boston Fish Pier from the South Channel fishing grounds, hav-



ing, along with his catch of cod and haddock, five small and one medium-sized mackerel, the latter weighing  $1\frac{1}{2}$  pounds. In addition to this Captain Shea reported that in dressing the codfish, tinker mackerel were found in the stomachs of some of the fish.

The first vessels to sail south were schooners "Mary E. Harty" and "Catherine Burke" which got away from Gloucester on March 30. These were followed quickly by the remainder of the fleet, until the total of about 25 crafts had sailed. The first of the mackerel netting fleet sailed on April 4. The first of the seiners to get away in 1920 was schooner "Squanto," Capt. Almon D. Malloch, on April 7. The first mackerel caught this year was taken at Chincoteague, one lone fish being caught on April 3, the first last year on March 31, at the same place. The first mackerel fare landed this year was brought in at the Fulton Market Fish Pier at New York by the fishing steamer "Helena", Capt. John J. Matheson, on April 7. Captain Matheson's haul was 6,000 pounds of fresh mackerel weighing from 2 to 3 pounds each, which sold at 65 cents per pound. The fare was taken in latitude  $37^{\circ} 52'$  north in 32 fathoms of water. The first mackerel fare landed last year was caught in about the same locality and brought in at Cape May on April 14, schooner "Stiletto," Capt. Ralph Webber, having 2,000 pounds which sold at about 50 to 60 cents per pound. The first of the netting fleet to land a fare was schooner "Anna," which arrived at Cape May on April 15 with 15 barrels of fresh mackerel.

The earliest of the seining fleet had no difficulty in locating the mackerel. Almost as soon as the vessels arrived on the far southern grounds they had four days and nights of fine weather, and it is the statement of the captains and those who were in the fishing vessels that never before had they seen such a large body of mackerel out south. Notwithstanding this, they were able to catch very few, the fish being extremely wild and diving almost as soon as the crew started to get the rings of the seine on the seine boat side. After this spell of fine weather came many days of bad weather. Several storms set in and very few fish were seen. What few schools were sighted were small and scattered, and nothing like the large body of fish first met



were again seen throughout the season. It is the opinion of many of the skippers that the spell of bad weather retarded the northern progress of the schools, which were not seen again this side of Chincoteague, and that instead of coming along up the usual course, the main body of the fish was diverted and went far off shore. The vessels cruised the grounds thoroughly up to May 15, and then came up as far as Newport. The first sign of mackerel in the vicinity of Newport was when the steamer "Nirvana" arrived there with 15,000 pounds of mackerel seined in that vicinity.

The netting fleet, which started earlier than usual, did not experience the success of last season. The fishing was very "spotty" and came in spurts, and good fares at the start were the exception and not the rule. This state of affairs continued up to the 10th of May. After this the netting fleet made some extra fine landings. On May 11 and 12, 27 netters arrived at New York and 40 at Atlantic City, with fares from 500 to 5,000 pounds each. Good landings were made at New York on May 17 and May 20, and on May 26, which was probably the biggest mackerel day in the history of the netting fleet, 266,000 pounds were landed by 45 boats at New York, the fares running from 1,000 to 15,000 pounds to a boat. On this day these fine fish sold as low as 8 cents per pound.

The first fares from the Cape Shore arrived at Boston on May 31, steamers "Nirvana," Capt. Lee Murray, and "Thelma," Capt. Martin L. Welch, making the Boston Fish Pier, the former with 75,000 pounds, and the latter with 51,000 pounds of fresh mackerel which sold at 10 cents per pound. The "Nirvana," in addition to her fresh fare, had 15 barrels of salted mackerel which sold at \$12 per barrel. Following this, the crafts of the Cape Shore fleet arrived in quick succession, and so good was the outlook that four returned in the hope of securing second fares, three out of the four being successful in their quest.

With the landings of the Cape Shore fleet all accounted for, the total fresh mackerel receipts for the season were increased to 33,000 barrels, this up to June 24. From this on to the close of the season, about December 1, when most of the late netting fleet hauled out, the catch was increased but 7,000

barrels. This gives a very clear idea of the extreme scarcity of mackerel for the five months of the summer and fall.

About the middle of the summer schooner "Squanto" sailed for the North Bay in hopes of securing a fare there. In October she succeeded in securing two good-sized hauls of fresh mackerel off Cheticamp, Cape Breton, which were landed at Port Hawksbury and shipped to Boston, bringing high prices. On receipt of these good returns five others of the seining fleet repaired to Cape Breton waters, but only two of these were successful in taking any fish, one of these crafts running into mackerel while bound home, securing a good fare. The other craft brought 80 barrels of salted mackerel which sold at \$37 per barrel.

A large fleet of mackerel netters operated during the fall, making their headquarters at Boston, Gloucester and Rockport. It is estimated that this fleet numbered 115 sail, mostly small craft. They fished all the way from 10 miles off Cape Ann down to the favorite fishing spots of the Isle of Shoals and Boon Island. Some fairly good hauls were made, but in general the prospects of a successful season were killed by several spells of bad weather and two heavy easterly storms. Thus closed another disappointing season in the history of the mackerel fishery.

The Massachusetts catches of fresh and salted mackerel from Dec. 1, 1920, to Nov. 30, 1921, inclusive, and for the corresponding period of the two previous years were as follows: —

	Dec. 1, 1920, to Nov. 30, 1921.	Dec. 1, 1919, to Nov. 30, 1920.	Dec. 1, 1918, to Nov. 30, 1919.
Salt mackerel (barrels) . . . . .	3,242	4,897	7,007
Fresh mackerel (barrels) . . . . .	40,323	79,799	55,375
Totals . . . . .	43,565	84,696	62,382

*Cape Shore Catches of Mackerel for Six Years.*

YEAR.	Arrivals.	Fresh Mackerel (Pounds).	Salt Mackerel (Barrels).
1921 . . . . .	29	2,160,000	3,003
1920 . . . . .	30	1,290,000	3,217
1919 . . . . .	32	2,119,000	6,275
1918 . . . . .	38	1,689,000	7,558
1917 . . . . .	32	2,229,000	7,131
1916 . . . . .	24	1,161,000	3,718

*Salt Bank Codfishery.*

The salt bank codfishing fleet was small, as has been the case for the past few years. Three vessels engaged in trawling and three in dory hand-lining. In addition to these, a few vessels, one of them from Boston, engaged in the same fishery without taking out their ballast. One of the dory hand-line crafts, the schooner "Esperanto," famed as the winner of the international fisherman's trophy, was lost off Sable island by striking a sunken wreck when almost ready to come home with a catch of nearly 300,000 pounds. Efforts to float the craft failed and the fare was lost to the market. The three-masted schooner "Aviator" was then fitted out by the owners of the "Esperanto" and sailed under the command of the same captain with a crew of 34 men. She was very fortunate, securing a fare of over 425,000 pounds of salted codfish. The "Aviator" is probably the first three-masted craft to engage in the banks fisheries from a Massachusetts port, and her crew is probably the largest also that ever engaged in any fishery from a Massachusetts port. The remaining dory hand-line craft and the trawl bankers did well on their first trips, and good average fares were secured on the second voyage. The market, ex-vessel, was lower than the previous year.

*The Shacking Fleet.*

Because of the restrictions placed upon the receipt of fresh fish from the eastern banks during the summer months by the Gloucester curers, as is fully explained in the report of the



inspector of fish in this volume, practically no vessels engaged in shacking. What crafts did come from the eastward with fresh fish were gone but a short time, and their fares were heavily iced, making them almost in market condition. A few vessels went to the eastward carrying some salt with which they preserved their early catches, and then came home with the late-caught part of their trips fresh.

### *Fresh Halibut Fleet.*

Following its success of 1919 and 1920, the fresh halibut fleet, enlarged in number to 26 sail, was rewarded with another most prosperous season; indeed, many skippers accounted it the best season for many, many years, both as regards size of catch and value. Besides the fleet operating from Massachusetts ports, some 16 sail of Nova Scotia vessels made Yarmouth, Shelburne and Digby their headquarters, and the great bulk of their catches came to the Boston market. In spite of this largely increased production, prices, while not averaging as high as a year before, were generally very good, sometimes reaching the high points of the previous season.

One of the noticeable features of the year was the increased use by the vessels of Gloucester and Portland as markets for their fares. The captains seemed to think it more advisable to divide their landings than to bring them all to one place. Boston, of course, retained the predominant part of landings for this fleet.

It is noteworthy that the fleet this year did not confine its operations so closely to Georges and Brown's Banks as has been the case in recent years, but many and large fares were brought during all parts of the season from the banks to the eastward, the old favorite fishing grounds on St. Pierre and Grand Bank being frequented with much success. One fare from Green Bank brought in by schooner "Catherine," Capt. Archie McLeod, totaled 114,140 pounds, the largest for a number of years. The stock on this fare was \$9,024. For the purpose of record, the fare was caught in Lat. 45° 1' north, and Long. 54° 33' west.

Several fares during the summer were sold and put into the freezer, and also during the season, when the prices admitted



of doing so, quite a quantity of halibut was sold to be flitched and salted.

The success of the fleet this year confirms the judgment expressed by many of the captains at the close of their season last fall, that halibut were increasing in number, and that with the larger fleet to thus keep better run of movements of the fish schools this profitable fishery would show better returns from year to year. In recent years it has been the custom for practically all of the fleet to haul out in late October and early November, starting again in February of the next year, but this season some of the captains, encouraged by the success of the summer and fall, will continue operations all winter.

### *The Gill Netting Fleet.*

The gill netting fleet, which only a few years ago numbered from 35 to 40 sail, and now reduced, by the excessive expense of operations and other reasons to some 15 or 20 boats, had a poor year, the winter catch of pollock and haddock from September to March 1 being less than 7,000,000 pounds. Those crafts of this fleet which did not then haul up, but engaged in shore fishing during the summer, did very little on account of scarcity of mackerel schools along the shore and lack of demand for herring, which is one of the standby fish of this fleet in the summer months. Gill netting was resumed in October, and up to the time of writing the fleet had found pollock in goodly quantity, but were obliged to sell them at 75 cents per hundredweight, which, with the extremely high cost of operation and nets, made their daily trips unprofitable.

### *Small Craft.*

In common with the majority of fishing crafts for the year the small boat fleet of Boston, Gloucester, Cape Cod, also Marthas Vineyard and Nantucket, had a hard year, finding fish scarce and prices generally low when compared with the quality and quantity of fish brought in. As the crafts of this fleet are almost exclusively equipped with gasoline power the upkeep and operating expenses are heavy, and this, combined with the small catches and low prices, made the year a discouraging one to the hardy shore fishermen, who at times took

desperate chances in these small boats to earn their livelihood. The large fleet of flounder draggers is not included in this résumé of shore boat operations.

### *The Flounder Fishery.*

The flounder fishery of 1921, pursued from various ports in season by fully, if not over, 125 craft, was one of the best in the history of the taking of these fish by otter trawling. The catch was large and prices at times very high. On the whole, returns were satisfactory, although at some periods the fish were almost given away. While quite a number of the fleet operating in Massachusetts and Barnstable bays and vicinity landed their fares at Gloucester and Boston, the centers of the flounder industry are Nantucket and Hyannisport, from which ports a large fleet extensively engages in operations, many of these craft running their fares direct to the New York market, while others ship their catches to New York, Boston and other places.

### *Cape Cod Activities.*

Reports from Cape Cod fishing centers show that the fishing season just concluded was one of the poorest for a long term of years, not more than 50 per cent of normal, and even below the discouraging total of 1920. The traps did nothing compared with other years; no squid struck in; the catch of whitening was greatly reduced; herring came along slowly and were in light receipt; there were several small spurts of mackerel, but no catch of any encouraging amount was made. The shore boats, as a whole, did not pay expenses, and the situation of the trap fishermen was the hardest for a long time.

### *Buzzards Bay Fisheries.*

The fishing season in the waters around Buzzards Bay and vicinity was a failure, as indeed it was all along the coast, only a few alewives and tautog being taken, while the spring catch of squid in the traps amounted to only about 300 barrels. Mackerel and swordfish were scarce, there being but 800 barrels of the former landed at New Bedford as against about 7,000 barrels in 1920. At New Bedford 650 swordfish were

landed as against 1,050 in 1920. These mackerel and swordfish figures do not apply alone to Buzzards Bay, but are the total of all boats landing at New Bedford. The result of the trap fishing on the north shore of Buzzards Bay may be summed up by the words of one trap owner, that he did not make enough this year to pay for a new down-haul for his trap. The fall catch, up to November 30, compares favorably with that of 1919, against practically none in 1920.

*Marthas Vineyard and Nantucket Fisheries.*

The catch of fish by Marthas Vineyard crafts, or marketed by outside vessels at Vineyard Haven and Edgartown, was about on a par with the previous year, with some exceptions. Most of the fleet landed at Edgartown. Quite a fleet of the larger boats fished for flounders by the otter-trawling method on the grounds near South Shoal Lightship and Georges Bank. They found fish plenty, and most of the fleet went through to New York to land their fares direct. Some good money was made in this branch of the fishery. The mackerel season was a complete failure, the netters hardly paying expenses, as after June no fish were taken.

The usual small amount of haddock was landed at Edgartown and shipped to the New York market. But few of the shore boats fished for codfish. The larger crafts fished on Nantucket Shoals. This fleet found fish plenty, but prices were poor. Most of these fares were landed at New York. Swordfish were fairly plenty inshore, more so than for a number of years, but the unfavorable weather prevented a good catch. The fish were landed at Edgartown. The price averaged lower than last year. Flukes were scarce most of the season. Scup and sea bass were also scarce early in the season, but fairly plenty during the latter part. No bluefish were reported to speak of, probably not more than 50 being taken around the island during the latter part of the season.

The run of alewives began very early (about March 1) and stopped a little earlier than usual. The catch was normal — about 6,000 barrels. The early market price was about the same as last year, but some lower for the later fish. The last run of the fish all sold for their scales.



About 50 boats fished out of Nantucket this year, doing well in the flounder fishery; but mackerel fishing was a failure. Very few went swordfishing, and they did very little. Had-docking and codfishing has been fair, but only about a dozen of the boats from this port were engaged. Scup fishing was poor and there was no bluefishing at all.

There were plenty of pollock in the spring, but only four or five boats were in this fishery for about two weeks. One boat went sturgeon fishing in June, July and August, doing well, realizing very high prices for both fish and roe.

The principal fishery here is for flounders, at which most of the boats at this time are doing well and making their catches inshore. There was no sea bass fishing from here this year.

#### *Boston Fishery Activities.*

Despite the fact that the Boston fresh-fish market was minus the services of the major portion of the steam trawler fleet for fully half of the year, there was an average year's landings. As against the good catch, however, it must be recorded that prices, ex-vessel, generally speaking, showed a marked decline from 1920, and on many occasions the market faced periods of underconsumption, which meant lessening of business, shortage of orders and consequent low quotations to the trade.

A critical review of a tabulation of the receipts, however, shows some gratifying features. While the total catch was nearly 12,000,000 pounds less than in 1920, codfish were in better receipt by almost 2,000,000 pounds. Hake and cusk also showed slight gains, indicating, perhaps, that these splendid eating fish are gradually finding their proper place in the fish scheme of things. The brightest spot is found in the halibut returns, receipts showing a gain over 1920 of nearly 1,200,000 pounds. As halibut averages as the highest priced fish the year round brought in in quantity by vessels of the fishing fleet, the gain is doubly pleasant to record.

Because of the utter slump of the mackerel fishery after June, the landings were but one-third of the 1920 total, but the mackerel fishery is always regarded as the great marine lottery of the fisheries, and a poor season is no indication that



the fishery is depleted or that the next season may not bring a banner catch to record.

The catch of haddock was below the figures of 1920 by nearly 10,000,000 pounds, but this is easily accounted for by the laying up of the bulk of the steam trawler fleet for at least half of the season, — at a time when the largest catches are made, — because low prices and business conditions did not warrant their operation.

	Dec. 1, 1920, to Nov. 30, 1921.	Dec. 1, 1919, to Nov. 30, 1920.
Large codfish (10 pounds and over) . . . . .	20,652,883	19,394,030
Market cod (those under 10 and over 2½ pounds) . . .	12,583,990	11,987,845
Cod scrod (those weighing 1 to 2½ pounds) . . . . .	497,510	160,363
Haddock . . . . .	55,038,213	64,861,174
Large hake (6 pounds and over) . . . . .	450,125	694,176
Small hake (under 6 pounds) . . . . .	2,661,488	1,647,788
Pollock . . . . .	3,129,260	2,973,941
Cusk . . . . .	930,637	617,198
Halibut . . . . .	3,667,997	2,482,266
Fresh mackerel . . . . .	2,041,631	6,157,600
Miscellaneous (butterfish, catfish, flounders, redfish, shad, smelt, herring, sturgeon, sharks, bonitas, swordfish, etc.).	4,389,172	6,912,413
Totals . . . . .	106,042,906	117,888,794

For reference and comparison of detailed catch of the several species landed, the table of the receipts for 1918 and 1919 will be of value: —

	Dec. 1, 1918, to Nov. 30, 1919.	Jan. 1, 1918, to Nov. 30, 1918 (Eleven Months).
Codfish . . . . .	32,265,992	36,457,622
Haddock . . . . .	61,504,416	47,752,660
Hake . . . . .	2,860,160	2,330,643
Pollock . . . . .	3,846,345	4,130,341
Cusk . . . . .	795,646	981,665
Halibut . . . . .	1,353,704	734,992
Mackerel . . . . .	4,000,513	6,412,715
Miscellaneous . . . . .	4,559,830	4,840,002
Totals . . . . .	111,186,606	103,640,640

The figures for the preceding tables are furnished, as in previous years, by Mr. F. F. Dimick, secretary of the Boston Fish Bureau. Mr. Dimick, who is so thoroughly posted on Boston fisheries matters as to make his comment authoritative, has the following to say on the Boston fish year:—

The year 1921 has been a very unsatisfactory one for the fisherman and producer. The catch of mackerel and swordfish was very light compared with past years. The vessels engaged in the market fishery for groundfish have had a poor season, and as prices have ruled low, stocks have also ruled low. For a large part of the year the stream trawlers were hauled up, as it was unprofitable to operate them, and only 60 per cent as many have operated this year as last.

The dealers have suffered with the fishermen owing to the light supply of fish, and have felt the effect of the general trade readjustment from a war to a peace basis. But the situation is improving and the year 1922 is expected to show considerable improvement.

The fleet that engaged in the halibut fishery in the Atlantic was probably the largest on record, and this fishery was quite successful. Quite a number of good trips were landed from the Grand Bank.

The catch of the traps on Cape Cod has been the poorest on record.

A new vessel has been constructed and has just begun operations in which there is much interest. She will use a small beam otter trawl, the same as used by the steamers. Her name is "Blanche Ring," and she is 67 feet long, 20 feet wide, 8 feet deep. She has a 100-horsepower oil burning Bolinger engine. The ground line of her otter trawl is 90 feet in length. She carries a crew of 10 men and all are part owners of the vessel.

### *The Gloucester Fisheries.*

Presenting a total of fish receipts from all sources of but 55,114,662 pounds, the Gloucester fisheries show the smallest catch return for over thirty years, and possibly the smallest in the last half century. Marked decreases in the landings of fresh codfish from the vessels, a decline of almost 50 per cent in the receipts of fish not the product of the American fisheries, and a marked loss in the total of fish received by rail, explains why the 1921 figures are some 10,000,000 pounds beneath the low total returns of 1920, which were accounted the smallest in total amount for a long period of years. Outside of the falling off in the landings of fresh codfish, the vessel catch as a whole is about on a par with last year, which gives little chance for

very encouraging words on the situation, with the exception of noting a large and gratifying increase in the landings of salt cod, caused mainly by the fact that the halibut fleet frequently brought from 10,000 to 30,000 pounds of salt cod along with their halibut fares.

The receipts of fish at Gloucester from all sources show a total of 55,114,662 pounds as against 77,977,515 pounds in 1920, and 133,638,765 pounds in 1919.

The great decline in the landings of fresh cod can be accounted for by the fact that there was practically no shacking fleet during the warm weather months, that is, vessels did not frequent the banks to the eastward for capacity fares of fish to be split for salting. As 90 per cent of these trips from these eastern grounds have in the past been codfish, the limitation on these fares explains the shortage which the table shows.

Collapse of the export trade, caused in major part by the prevailing rate of exchange, answers in full for the decline in the receipts of fish by rail, and also, in a great measure, the landings of fares of Newfoundland, Nova Scotia and Quebec province salted cod, not the product of the American fisheries.

The first half of the year can fairly be characterized as one of the dullest periods ever experienced by the Gloucester salt-fish industry. During the fall business showed a gratifying increase of orders, followed by the expected winter dullness. The short stock of fish on hand, however, coupled with the improved fall trade and prospects of New Year orders, causes the optimistically inclined to predict a bare market for the spring catch, with naturally better prices, ex-vessel, and also to hope that the deepest of the post-war period gloom is past, and that the business as a whole — catching, preparing and purveying to the public — will gradually improve until the "average year" shall soon again be reached.

The figures making up Gloucester's fish story in tabulated form shows, among other facts, a gratifying gain in the landings of fresh halibut, indicating that Gloucester as a market for this fine product is coming back.

The following comparative table gives the receipts from all sources at this port for the past three years: —



	Dec. 1, 1920, to Nov. 30, 1921.	Dec. 1, 1919, to Nov. 30, 1920.	Dec. 1, 1918, to Nov. 30, 1919.
Salt cod . . . . .	4,971,386	2,987,751	3,064,673
Fresh cod . . . . .	12,579,119	25,835,345	28,087,983
Halibut . . . . .	404,473	160,392	306,570
Haddock . . . . .	8,253,660	8,473,534	16,127,331
Hake . . . . .	3,481,342	1,480,557	779,840
Cusk . . . . .	1,091,972	575,399	779,972
Pollock . . . . .	4,646,773	5,117,982	18,524,658
Flitches . . . . .	11,850	5,365	8,476
Not product of American fisheries . . .	9,109,306	14,694,475	25,733,450
	44,549,881	59,330,800	93,352,953
Fresh mackerel . . . . .	Pounds. 540,880	Pounds. 420,542	Pounds. 302,188
Salt mackerel . . . . .	Barrels. 3,071	Barrels. 3,988	Barrels. 7,457½
Fresh herring . . . . .	Pounds. 1,366,400	Pounds. 842,500	Pounds. 1,777,844
Salt herring . . . . .	Barrels. 8,708	Barrels. 13,859	Barrels. 32,231
Cured fish . . . . .	Quintals. 22,458	Quintals. 9,803	Quintals. 12,265
Miscellaneous: —			
Small boats (estimated) . . . . .	Pounds. 1,200,000	Pounds. 2,000,000	Pounds. 5,000,000
By rail . . . . .	2,674,009	7,888,949	23,410,979
Flounders . . . . .	— <sup>1</sup>	200,000	200,000

	Summary.	Pounds.
Total, 1918 (to November 30) . . . . .		143,442,954
Total, Dec. 1, 1918, to Nov. 30, 1919 . . . . .		133,638,765
Total, Dec. 1, 1919, to Nov. 30, 1920 . . . . .		77,977,515
Total, Dec. 1, 1920, to Nov. 30, 1921 . . . . .		55,114,662

*An Unusual Catch.* — A catch somewhat out of the ordinary was made on October 12 when Howard Hodgkins' trap off Rockport made a haul of 300 pounds of striped bass. Old Rockport fishermen said it was the first catch of this kind in that locality for at least forty years. The fish taken in this haul weighed from 2½ to 5 pounds, the average weight being about 4 pounds. Mr. Hodgkins reports that off and on during the summer small numbers of these fish were taken in his traps, weighing from 1½ to 7 pounds. A few were also taken in traps in Gloucester Harbor and weighed about the same.

<sup>1</sup> Included in small boats catch.



*Run of Small Bluefish.* — During the fall the inshore waters, from Ipswich to Gloucester, were visited by a run of small bluefish. These fish entered the Essex, Annisquam and Little rivers in considerable abundance. They took a baited hook readily and catches were made. The traps in Gloucester Harbor and at Rockport also took quite a number of these fish, the catch on some days being as high as a barrel. The fish generally averaged from five to ten to a pound, but the largest two noted, caught in a Gloucester Harbor trap, together weighed 6 pounds. It has been many years, according to local fishermen, since bluefish were seen or taken in Cape Ann waters, and many fishermen aver that it has been twenty-five years or more since they have heard of or seen bluefish taken in the Annisquam River.

*Large Catch of Porgies.* — On August 14 large schools of porgies made their appearance in Boston Bay, the main body of the schools centering close inshore from Beverly to Nahant. The fish were quickly followed by a fleet of ten New York porgy steamers which immediately began fishing operations. The seines of the steamers were set quite close inshore, and the unusual fishing scene was viewed by hundreds of sightseers at Swampscott. So plentiful were the fish that they came almost in the surf along the rocks and beaches. As a result of their three or four days' operations in the vicinity above noted, the porgy steamers, which have a capacity of about 4,500 barrels each, made hauls which they estimated totaled fully 25,000 barrels, if not more.

While the porgy schools were in this vicinity many of the small boat fishermen of Swampscott availed themselves of the opportunity of catching a goodly bait supply. While the largest hauls were made during this spurt, yet porgy schools were seen in the bay, but further off shore, several times during the summer, with porgy steamers near by maneuvering to catch them.

#### THE LOBSTER FISHERY.

From the best observation and information obtainable the lobster fishery of Massachusetts shows an increased catch over the previous year, and improved conditions and prospects are noted in many localities. True, the report from the

majority of fishing spots is that of normal fishing, but at the same time more localities reported both catch above normal and the outlook (because of many more short and egg-bearing lobsters than usual in the traps) more promising, than reported their catch below normal. Even in several of the latter cases, as well as in many reporting a normal season, the returns showed an increase in the number of short and seed lobsters found.

The returns of the lobster fishermen, required by law, show an increase in the catch over 1920, the total number of lobsters taken being 1,547,469 as against 1,262,241 in 1920. An increase over the previous season is also noted in the number of men and boats engaged and pots set. The number of egg-bearing lobsters taken and returned to the water was also more than reported in 1920.

In accepting the total given above as the Massachusetts catch for 1921, it should be borne in mind that between 20 and 30 large boats fish outside the 3-mile limit in waters contiguous to Dukes County, therefore requiring no State license, and also not being obliged to make an annual report of their catch. The catch of this fleet is considerable, and would add materially to the total figures. The gratifying feature of the increased catch is that it is not only in the total, but also an actual increase per pot set in the fishery.

The catch of 1921 is the largest in number since the 9-inch legal length law went into effect in 1907, and also the largest of any year since 1890. Statistics of the catch are published in the Appendix.

The short and seed lobsters seized in the spring from shipments from Nova Scotia to Boston numbered 22,000, as against 12,650 the previous year, 18,000 in 1919, 8,000 in 1918, and 37,000 in 1917. They were distributed on advantageous lobster-fishing spots along the coast.

As required by section 106, chapter 130, General Laws, it is herewith reported that the number of lobster licenses issued in 1921 was 1,002.

The lobsters struck in about a month earlier than usual, and not only shed from three to four weeks before the usual time, but new shell lobsters were taken in April, the earliest ever

known according to the lobster fishermen. In some localities, particularly in Norfolk County waters, the shell shedding extended over the whole season, some "shedders" being taken since November 1. Nantucket fishermen report what they term a "new species" of lobster, a great many from 5 to 7 inches long being observed, the shells of which were very light red in color, appearing, when taken from the water, as though they had been actually boiled.

Out of 54 questionnaires sent out to lobster fishermen and wardens in the lobster fishing counties, replies were received from 40 persons giving much interesting, detailed information, and on these replies the following statements are based: —

From Essex County, five reported the season's catch below the average, three an average season, and two a catch above the average. While three reported the number of short lobsters found in the pots as normal, six stated that the number of "shorts" was more than in any of the past few years, and one replied that the number was double that caught in any recent year.

Four reported that the general run of the catch as to size was normal, while five stated that the lobsters ran larger than usual, one, however, reporting that the crustaceans ran smaller than usual.

Five reported the fact that the lobsters shed from three to four weeks earlier than usual as the distinguishing feature of the season. Another stated that the lobsters struck in one month earlier than usual, and noted as an unusual occurrence that the best fishing was in July, something that had never occurred before to his knowledge. One noted the unusual number of shorts as the outstanding feature of the season. New shell lobsters were taken in April, the earliest ever known by two correspondents.

Of the three replies from Norfolk County two termed the catch normal and one below the average. The number of shorts was less according to one, and about the average in the opinion of two. Two found that the catch ran to larger lobsters than usual, and one to smaller.

One, who has been a keen observer for years and holds high rank among the lobster men in their local and State asso-



ciation, made the following significant statement in reply to the question as to anything unusual to distinguish the season from other years: "Nothing except a steady decline in the supply, and it appears to me, also to many of the fishermen in this district, that there is a steady falling off in both egg and merchantable lobsters, and unless there is a change in the legal length of the lobsters the industry will steadily decline."

Freaky or erratic movements of the lobster schools, with the shedding extending over the whole season, with some shedders being taken since November 1, was the comment of another.

Of the three replies from Bristol County two considered the catch normal, and one above normal. The number of short lobsters found in traps was more than usual according to two, while one found about the usual number, but found them smaller than usual. The catch ran more to small lobsters than usual according to two, while one found about the average run as to size.

The distinguishing feature according to one was that the lobsters ran small, and there were plenty of them, but not many would measure to the standard gauge. Another remarked: "The fishermen report this season's catch to have been one of the best they have ever known, also the number of shorts which were caught and put back in the water."

Plymouth County replies from six showed four reporting a normal catch, one terming the catch above and one below the average. As to the number of short lobsters observed, three termed the season normal, while three considered more were found in the traps than in the past few years. As to the run of the catch, two found the size larger than usual, one smaller, two normal, and one reported larger offshore and smaller inshore.

As to distinguishing features, one replied that there was an unlimited supply of lobsters in July and August. In July, one fisherman who set 125 traps reported that he took 213 lobsters in one day, the largest number he ever caught in one day. Instead of the expected good fishing offshore this fall the lobstermen found the lobsters scarce and either soft-shelled or getting ready to shed, which was unusual for this time of the year.



Barnstable County, through seven replies, showed a variety of opinions. Two considered the season above, two below, the average, and three normal. As to the number of "shorts" taken in the traps, four said more and three said less, as compared with recent years. The catch ran to smaller lobsters according to two, larger according to two, average in the opinion of two, and larger offshore and smaller inshore in the opinion of one.

The following distinguishing features were noted in the replies: "At least twice as many lobsters were caught this season as last — some parties claim three times as many. The quality has been very poor and the price low on that account. The lobsters shed early and kept shedding all summer. The large lobsters were very soft in July and August. The shell was hard, but the meat very soft and milky."

The Dukes County report contained four replies that the season was above the average, one terming it the best since 1908, while two considered the catch normal. As to the number of shorts taken one stated: "Plenty of shorts. Only 20 per cent of our daily catch came up to measure. Lobsters have been on the increase since fishermen stopped saving shorts a few years ago."

The outstanding features in this district were that legal lobsters were plentiful at a time when they were cheap, averaging 13 cents per pound to the fishermen during July. A great many more "short" lobsters were observed than usual. Said one: "Lobsters have not been so plentiful since 1908." Another reply read: "More men, more pots and a greater number of lobsters per pot than I have ever seen in thirty years' experience."

From Nantucket five replies were received. Three referred to the season's catch as above, and two below, the average. As to "short" lobsters, less were observed off Sankaty Head and one other spot, but more on all the other grounds. One report stated: "500 per cent more;" another: "More shorts than for ten years. A great many 3 and 4 inch ones on the inshore grounds." Seed lobsters were deemed more numerous by three, and few, or below the average, by two. In every instance the size run of the catch was termed smaller than usual, with one report of larger offshore.

Features of the season were noted as follows: The great number of small lobsters seen on the grounds. Many more "shedders" than last year. Around Sankaty Head the bottom was very foul on account of the water being so warm, which may account for the small catch there.

#### THE BLUE CRAB (SOFT SHELL) FISHERY.

The common edible crab of the middle and southern Atlantic States is the blue crab (*Callinectes sapidus*). In Massachusetts it is less common than the smaller lady crab (*Ovalipes ocellatus*) which, except for its smaller size, is equally tasty, and the rock crab (*Cancer irroratus*), which is less suitable for food. The warm water habitat of the blue crab precludes any extensive fishery in Massachusetts, as it is only found in certain estuaries on the south side of Cape Cod and in Buzzards Bay.

In Bass River, Edgar N. Baker, an experienced observer for many years, states that some may have been obtained for the market in years past, but since the severe winter of 1919-20 the blue crab has been conspicuous by its absence, and rarely could one be seen during the past year.

While a few crabs are to be found in Buzzards Bay, the New Bedford Fish Company is unable to find any one who makes a business of catching them for the market.

The other species of less economic importance are occasionally used for food. During the summer crabs are sold at Hough's Neck, Quincy and at Weymouth Bluffs to local trade, and at Nantasket beach two or three men engage in catching, cooking and selling this crustacean from June 1 to November 1. At North Plymouth a few are sold among the Italians, and occasionally some may be seen on sale in Boston.

#### BOUNTIES ON SEALS.

Provision was made in 1919 by section 155, chapter 130, General Laws, for the payment of a bounty of \$2 on any seal taken in Massachusetts, on claim properly presented to the town treasurer.

Claims have been paid by towns, for which they have been reimbursed by the Commonwealth, as follows:—

TOWN.	NUMBER OF CLAIMS.		
	1919.	1920.	1921.
Barnstable . . . . .	300	6	1
Carver . . . . .	-	1	-
Chatham . . . . .	-	-	1
Duxbury . . . . .	-	15	7
Edgartown . . . . .	-	-	3
Essex . . . . .	-	-	1
Gloucester . . . . .	100	-	3
Ipswich . . . . .	100	-	2
Nahant . . . . .	-	1	-
Nantucket . . . . .	-	-	2
Newburyport . . . . .	-	-	8
Plymouth . . . . .	400	3	6
Revere . . . . .	-	1	1
Rowley . . . . .	-	-	3
Tisbury . . . . .	-	-	1
Wareham . . . . .	-	-	1
Winthrop . . . . .	500	-	-
Yarmouth . . . . .	-	6	26
Total number of seals . . . . .	1,400	33	66
Total amount claimed . . . . .	\$2,800	\$66	\$132
Fees to town treasurers for services . . . . .	\$700	\$82 50	\$33

### MOLLUSK FISHERIES.

The general condition of the mollusk fisheries has shown a slight improvement. The credit for this favorable aspect, however, is due to natural agencies which have brought about exceptional sets of small mollusks, rather than to the efforts of man. Little advance in cultural methods by shellfish farmers has been achieved. Considerable yet remains to be done, and in order to fully develop the natural mollusk resources, the lethargic attitude of the planters must be shaken off.

The Division during the past few years has endeavored to follow the changing conditions in the mollusk fishery by obtaining reports from the various localities through the co-operation of observers to whom questionnaires are sent annually. Acknowledgment is made of the interest and courtesy of these observers.



The Cape Cod Board of Trade, under the energetic leadership of Admiral Francis T. Bowles, has taken considerable interest in the development of the mollusk fisheries of Barnstable County. Upon the request of Admiral Bowles a statement was submitted by this Division giving a survey of the conditions for these towns, with recommendations as to the improvement or rehabilitation of these fisheries.

### *Clams.*

Reports from the various clamming centers indicates a generally successful season, above the average. Not only has there been a good yield, but many areas of heavy set have been discovered. It is a satisfaction to report the present favorable conditions in the industry, since it illustrates the remarkable recuperative powers of nature in perpetuating an industry which fifteen years ago appeared to be rapidly declining. The influence of man has also had some bearing upon this recuperation, and the industry has been helped by regulating the digging, and, in certain localities, by planting clams.

*Ipswich Bay.*—The supply of clams in Newburyport, Newbury, Rowley, Ipswich, Essex and Gloucester has been more than sufficient, and, on the whole, the clamming has been very good. The yield has been below normal from the Salisbury flats, as the result of overdigging. There has been a good supply of clams of marketable size, and a plentiful set of "seed" clams. Most of the clams are sold to automobilists along the Bay Road.

*Gloucester to Cohasset.*—The waters of Lynn, Boston and Cohasset harbors have practically all been closed to commercial clamming by the Department of Conservation upon request of the Department of Public Health, owing to the pollution of these waters, and the resultant danger to the public health. In nearly all of the closed areas clams are abundant.

*Plymouth to Sandwich.*—The amount of clams dug in Plymouth Harbor has been greater during the last few years, owing to the cultivation of the clam flats by private companies. In 1921 the same amount was taken as during the past



four years. Clams are found in smaller quantities between Plymouth Harbor and Sandwich.

*Cape Cod.* — The yield in this section has been about normal. Nearly 12,000 barrels of clams have been shipped from Barnstable Harbor from June to November, and many thousand barrels still remain. On March 31 a representative of this Department attended a hearing at West Barnstable relative to the continuation of the policy of leasing clam grants by the selectmen of the town of Barnstable. At that time evidence was submitted relative to the enormous number of clams in Barnstable Harbor, the result of a superabundant set.

*Buzzards Bay.* — About the average annual yield has resulted in this locality, and no marked improvement in supply has been noted. Most of the beds are in easy reach either by motor vehicles, electric cars or on foot, and are overworked because of the numerous summer cottages which thickly fringe the shore. At Marion about 75 barrels were dug for local trade.

*Mount Hope Bay and Taunton River.* — In this section about 7,500 bushels of clams were dug. Dighton had a fair quantity of clams which, however, were poor quality, owing to the occasional freshness of the water, which made them of little value except as bait. On the Taunton River shores of Somerset the clams are of no value owing to pollution, but upon Mount Hope Bay shores, about 1,500 bushels of marketable quality clams were taken. In Swansea about 6,000 bushels were taken, and marketed at almost \$3 per barrel. An exceptionally fine set augurs well for a successful season next year.

*The Islands.* — At Edgartown the usual supply was consumed almost wholly by the local market, as prices were low and freight rates were high. At Nantucket an increase in the supply and a good set of "seed" clams on all the flats were reported.

### *Scallops.*

The past year has been successful for the scallop fishermen. In the winter and spring high prices and a poor to fair catch prevailed. In the fall lower prices and a good supply were the rule.

*Cape Cod.* — A decided improvement has been noted in the scallop fishing on the south side of Cape Cod.

*Buzzards Bay.* — In spite of the scarcity of seed scallops the previous year, the 1920-21 season has proved even better than last year, but inferior to two years ago. In the New Bedford waters, and on the west side of the bay, it has proved to be an exceptional year, far ahead of last year, and, with one exception, the best in the last ten years. At Marion the present season has been better than the average, due in a measure to the high prices. The outlook for next year is excellent. Mr. Walter K. Perry states that on the off shore he has never before seen so much seed. This area extends south from Bird Island as far as Cleveland Ledge, and west to Bow Bell Ledge; also, in Sippican Harbor there are some seed, and off Great Hill along the Wareham line. If the seed winters well, a successful season next year is predicted. From October 1 to Nov. 20, 1921, 8,000 gallons were taken and sold from \$2.25 to \$4 per gallon.

*Mount Hope Bay.* — About 200 bushels were taken in Coles River.

*The Islands.* — The supply of scallops in the fall of 1921 was the best for two years in Nantucket Harbor. No report could be given until after Dec. 15, 1921, as to the yield in the outside waters of Muskeget and Tuckernuck, where fishing does not take place before the grass goes off with heavy northeast gales. A splendid set of seed is reported everywhere on the scallop grounds, which, if not winterkilled, will furnish some fine fishing next season. At Edgartown the season did not open until November 1. In 1920-21 there was a fair catch, and the high price of \$7.50 per gallon was received for part of the season by the fishermen. In the fall of 1921 scallops were very numerous and of good size. Forty boats were landing about 700 bushels daily, at a price of \$2.50 to \$2.75 per gallon. There was a very large set of seed scallops.

### *Oysters.*

The oyster industry of Massachusetts is passing through a quiescent or stagnation period. It is barely holding its own. Most assuredly it is not expanding. This condition is partly due to inability to get suitable seed and partly to the general

depression which has affected the entire oyster business of the Atlantic seacoast.

*Cape Cod.* — The annual yield of oysters has been about normal.

*Buzzards Bay.* — An average year has resulted. On the natural beds, in Weweantit River, a fairly good set was noted.

*Mount Hope Bay and Taunton River.* — In Dighton and Somerset about 500 and 4,000 bushels of seed oysters, respectively, were taken from natural beds. In these waters the adult oyster is of no commercial value. Pollution has increased noticeably, especially owing to the refuse from the mammoth oil refinery at Fall River.

#### *Quahaugs.*

The quahaug fishery has shown little change, the catch running about the same year by year. The famous bed off Nantucket has shown the effect of severe overfishing, offset in part by the discovery of new areas. No new advance in quahaug culture has been made and little additional work has been done along this line by practical planters.

*Cape Cod.* — A normal year is reported.

*Buzzards Bay.* — An average yield was obtained on the east side of Buzzards Bay, and no change was noted in New Bedford waters. At Marion there was a poor season and a poor set, only 150 barrels being taken. Prices ranged between \$6 and \$7 per barrel.

*Mount Hope Bay.* — In Swansea quahaugs are scattering, and a fair amount is taken. In Coles River is a grant to which quahaugs from the polluted areas in the Acushnet River are transplanted and later shipped to market.

*The Islands.* — At Edgartown the catch was slightly in excess of the average, as quahaugs were more plentiful. Prices, however, were about 25 per cent below those of the last two years. At Nantucket the quahaug fishing in the harbor shows little change, but an appreciable decline in the yield of the large outside beds is evident. Only about 10 boats, with a maximum catch of 25 barrels per day, are now engaged in the fishing. Five years ago these same boats could easily obtain



75 to 80 barrels of large quahaugs per day on the same beds. Quite a large quantity of small "seed" quahaugs have been found, and with only a few boats in the business, the fishing should improve each year. The depletion of this wonderful bed of quahaugs within five years well illustrates the effect of overfishing by man.

On Nov. 12, 1921, a large bed of quahaugs was discovered between the old bed of deep-water quahaugs and Great Point. The exact limits of this new bed, which is extensive, have not as yet been determined. The boats catch 40 to 50 bushels per day by dredging. Nantucket is indeed fortunate to discover this new source of mollusk wealth at a time when the old beds were approaching depletion. History inevitably repeats itself, and in a few years this new territory will be destroyed by overfishing.

#### *Shad.*

Owing to the scanty supply in California, the only available source of supply, there could be no continuation of experiments in shipping shad eggs across the continent for hatching and distribution in Massachusetts waters.

#### *Alewives.*

*Fishery.* — The 1921 season was inferior to previous years owing to lower prices, although the yield in certain streams, such as the Mattapoissett River, showed a noticeable increase. The sale price showed a marked decline, *e.g.*, the Agawam River fishing right, which in 1920 sold for \$11,000, and in 1921 for \$200. This decline in valuation was due to the curtailed demand for herring scales for the manufacture of artificial pearls. The 1921 sale price for certain streams where fishing or seining rights were sold are given below.

Agawam River . . . . .	\$200 00
Bass River . . . . .	49 38
Herring River, Harwich . . . . .	1,900 00
Mattapoissett River . . . . .	105 00
Mill Pond Brook, Brewster . . . . .	160 00
Taunton River . . . . .	168 50
Town Brook, Plymouth . . . . .	355 00



Further results of the careful handling of the resources of the Mattapoisett River are apparent. In 1917 the fishery was in an impoverished condition. By allowing the entire run to reach the spawning grounds in 1917-19, excellent results were obtained in 1920. These were surpassed this year, as more alewives than ever before were seen in this river, — a striking illustration of the natural recuperative powers of nature when aided by the efforts of man.

*Industry.* — The usual marketing of the catch was followed, shipments of salted alewives being made to the West Indies. A slight increase in the demand for fresh fish was evidenced. The industry, from the standpoint of a commercial valuation, showed marked deflation, owing to the abrupt curtailment of the abnormally high prices once offered for the scales.

*Investigations.* — Investigations during 1921 have been confined to (1) the examination of obstructions on certain streams, (2) inspection of fishways, and (3) stocking experiments.

*Obstructions:* In November a study was made of conditions interfering with the passage of young alewives from White Island Pond down Red Brook. On Santuit River the co-operation of the cranberry bog owners, by following instructions from this office relative to the proper maintenance of fishways, proved an aid to the fishery. The attention of the board of selectmen of Eastham was called on October 29 to the conditions at the outlet of Herring Pond, which by its closure prevented the return of the young alewives to salt water.

*Fishways:* Inspections were made of the following fishways: Ipswich Mills, Essex Company, Middleborough Electric Light Company, Bournedale, Agawam and the George O. Jenkins Company.

*Transplanting:* The work of restoring the depleted alewife fisheries has been carried on by installing fishways wherever necessary, and by planting mature alewives upon the spawning grounds in the fresh-water ponds. Stocking operations have been confined to planting alewives in the headwaters of the Taunton River, in Robbins, Monponsett and Nippenickett Ponds, access to which had been provided by the establishment of five fishways.

For many years past these natural spawning grounds have been shut off by dams, and the ponds upon the Nemasket River were the only available breeding grounds for maintaining the supply of Taunton River alewives. This limitation of available spawning ground has been one of the chief reasons for the gradual depletion of the Taunton River alewife fishery.

In 1917 the first step toward developing the Taunton alewife fishery was undertaken, that is, providing an unobstructed passageway from the sea to the former spawning grounds. Through the co-operation of the Connecticut Mills Company, a new efficient fishway was installed at East Taunton, and subsequently fishways were installed at Jenkins Leather Board Factory, Bridgewater, at the Carver Cotton Gin Company, East Bridgewater, and the Stanley Works, Bridgewater. This year work was started upon the final fishway in the Taunton River series, at the Easton Investment Company on the Town River (part of the Taunton system) at West Bridgewater. When completed this will provide an unobstructed passageway to Nippenickett as well as to Robbins and Monponsett Ponds.

To expedite the restoration of the Taunton alewife fishery, spawning alewives were planted in Lake Nippenickett, West Bridgewater, Robbins Pond, East Bridgewater, and Monponsett Ponds, Halifax. This will hasten the utilization of the spawning grounds made newly accessible, and insure the use of the fishways sooner, by alewives hatched in these ponds. For, according to the known habits of alewives, the fish return from the sea to spawn in the same locality in which they were hatched.

There were planted in Robbins Pond 728, and in Monponsett Ponds 710 alewives. After spawning, these fish, and later their progeny, passed out of the ponds down the Satucket River and thence to the Taunton River and into the ocean. Lake Nippenickett received 1,260 alewives which reached the Taunton River by way of the Town River, the outlet of the lake.

The work of stocking was in charge of Warden Tribou of Brockton. The Division wishes to acknowledge the wholehearted co-operation of Dr. Allan L. Shirley, Mr. A. L. Parker and Mr. George Cobb of Bridgewater, Mr. George Williams of Raynham, and Mr. Edward Williams of East Taunton, who

furnished transportation for the fish. Thanks are also due to the selectmen of Pembroke, who furnished spawning alewives from the Pembroke weir. As a result of the efforts of these men, the 2,698 alewives were planted at a relatively slight expense to the Commonwealth. The fish were transported in ordinary galvanized iron fish cans, aerated with pumps. Ten to the can was the rule, although this number was often exceeded. Only 32 out of a total of 2,730 were lost, and practically all were in good condition when planted.

In the Monponsett Ponds large schools of small alewives were noted in the late summer and fall, particularly at the sluiceway between the two ponds, but by November these fish had passed down stream to salt water.

Respectfully submitted,

WILLIAM C. ADAMS,

*Director, Division of Fisheries and Game.*





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## APPENDIX

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## APPENDIX.

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### RECOMMENDATIONS.

The Director of the Division of Fisheries and Game respectfully recommends the passage of laws designed to accomplish the following purposes:—

1. *To allow the Governor to proclaim Temporary Close Seasons on Fish and Game.*—Occasionally it happens that because of climatic conditions or because of a disease which may suddenly attack various species of fish and game, the continuance of an open season as prescribed by law might seriously deplete, if not exterminate, the species affected, and as this might occur at a time when the Legislature is not in session, it is expedient that the Governor be clothed with authority to set aside the open season.

2. *To allow Wardens and Deputy Wardens of this Division to cross Private Property.*—Under the new Revised Laws only the Director has the right to cross private property in the performance of his duties. If the wardens and deputies do not have this authority their effectiveness is very much reduced. When this Department was under the control of “commissioners,” and the men were “deputy commissioners”, the law could be interpreted to give them this right.

3. *To have the Fish and Game Law Amendments take Effect on January First of the Year following the Date of their Enactment.*—It is desirable to get information of changes in the laws broadcast before attempting to enforce the new laws, and as the news seems to travel slowly it would seem expedient to have the new laws go into effect on a certain date, and thus give the public ample time to acquaint themselves with them.

4. *To have the Fishing License Law apply to All Inland Waters, and to amend the Laws relative to the Issuance of Duplicate Certificates and the Exportation of Game.*—The present law requires licenses for fishing in only those inland waters which have been stocked by this Department since Jan. 1, 1910. The publication yearly of lists of waters stocked during the year involves considerable expense. Further, by reason of the fact that many

streams are known by various names, much confusion is created in the minds of persons who wish to determine whether a stream has or has not been stocked. Many of the unstocked inland waters are being depleted, and we believe they should be protected by requiring licenses for fishing therein.

A person wishing to secure a duplicate of a lost or destroyed license is required by the present law to apply either in person or by letter at the office of the Division of Fisheries and Game. This is an inconvenience to the public and creates a volume of work in the office of the Division at the busiest season of the year. An amendment permitting the issuance of duplicates by city and town clerks will remedy this, and the 25-cent fee will have the effect of reducing the number of licenses lost.

Under the existing law there is no limit to the amount of fish or game which a non-resident may take out of the State under his license, except in the case of birds and brook trout. Inasmuch as the Department is bending every effort to conserve the supply of wild life within the Commonwealth, it seems only just and fair that a limit be set.

5. *To permit the Issuance of Licenses to Certain Minors under Restrictions.* — There are many minors under the age of fifteen, now set by law, who could be allowed to have permission to hunt with firearms if accompanied by some one who could coach them along and prevent them from trying reckless stunts. The license would not be operative if they went out alone.

6. *To allow Non-resident Hunters the Right to attend Field Trials the Same as the Right now possessed for Fox-hunting Activities.* — This is to take care of an oversight in the hunting license law, and allow field trials which will not injure our game and thus not put a heavy burden on non-residents who are here for a few days only.

7. *To permit the Importation into Massachusetts of Fish and Game taken legally outside the Commonwealth and to permit Possession of Such Fish and Game after the Close of the Season.* — The present laws permit the taking of the bag limit of fish and game on the last day of the open seasons; but the person taking it cannot reasonably be expected to dispose of the same immediately. The accompanying act will give a reasonable length of time for the disposal of game and fish legally taken during the open season. It will also permit the importation and possession, after the close seasons in Massachusetts, of fish and game taken legally outside of the Commonwealth.



8. *To make the Laws of Massachusetts relative to Migratory Birds conform with the Laws of the United States.*—The Federal government has entered into a treaty with Great Britain for the uniform protection of migratory birds on the American continent. The Federal laws in this connection render conflicting State laws void. For the convenience of the public, and for the proper enforcement of the law, it is desirable to have the laws of this Commonwealth conform with the Federal rules and regulations.

9. *To provide for Reports from Trappers to show to what Extent they are Commercializing the Fur-bearing Animals.*—At the present time we have no way of estimating the number of fur-bearing animals in this Commonwealth. They are a valuable natural resource, and we should have information as to their abundance and value.

10. *To permit the Importation of Live Hares and Rabbits.*—Our season is shorter than in other States, and many interested parties desire to purchase live hares and rabbits to stock our woods. Under the present law they must be imported and liberated during the open season, and they may be killed off immediately with no chance to propagate. It is surely no harm to bring them in during the close season to stock our covers if they have been legally taken in some other State.

11. *To prohibit the Use of Dogs during the Open Week on Deer.*—Many dogs are taken into the woods during the deer week under the guise of hunting fox, raccoons, rabbits, etc. They are really used to help take the deer, but it is impossible to meet the situation under the present law. If all dogs are ruled out of the woods during the open week, the same as rifles are, the matter can be handled more fairly.

12. *To prohibit the Use of Snares.*—The present law forbids the use of wire snares, but cord snares are just as deadly to dogs and game and also to human beings. No snares of any sort should be allowed in the woods.

13. *To extend the Close Season on Quail in Certain Counties.*—There are few quail left in these counties. While they have been protected during the past few years, and have shown an increase, it has not been sufficient to warrant an open season.

14. *To repeal the Salmon Law on Lake Quinsigamond.*—Under present laws the Commissioner of Conservation has the right to make rules and regulations for the taking of salmon, and there is no reason why they should not apply to this lake

as well as all others. The situation which required a special law for that lake no longer exists.

15. *To regulate the Catching and Sale of Fresh-water Fish.* — Winter fishing and absence of restriction on the sale of pond fish have been two of the principal causes of the depletion of inland fisheries during the past few years. Progressive conservation demands that catch and sale limits be established.

16. *To extend the Close Season on Black Bass.* — Bass are late spawners and need more time to carry eggs than other fish. They are easily caught in the late spring after hibernating and not eating during the winter.

17. *To establish the Authority of the State Inspector of Fish.* — The original act imposed certain restrictive measures on the sale of fish, but it contains no definite statement as to the authority of the Inspector or his deputies to enforce the provisions of these sections.

18. *To amend Certain Sections of Chapter 94 of the General Laws.* — It is advisable to change the wording in a few places so that the provisions will be clearly understood and no inconsistent statements contained therein.

19. *To allow the Commissioner of Conservation to sell Certain Lands and Buildings in the Towns of Palmer and Wilbraham.* — It seems advisable to either turn over to some other State department or to restore as taxable property certain parts of the Palmer fish hatchery and the Wilbraham game farm as appear to be no longer needed for maintaining operations at these two stations.

## STATISTICS.

*Returns from the Shore Net and Pound Fisheries for the Year 1921.*

["L" indicates that the person engaged also in lobster fishing, and the figures are given in the table entitled "Returns from Lobster Fisheries, 1921."]

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pounds.	Value.	Number of Nets.	Value.
Cape Cod Fish Freezing and Packing Company	Barnstable	9	5	\$4,000 00	6	\$10,600 00	18	\$225 00
Barnstable Trap Company	Barnstable	7	3					
George W. Sturgis	Barnstable	1	2					
Stephen M. Richards	Beverly	2	4	170 00	-	-	-	-
J. E. Eldridge	Brewster	1	-	-	2	150 00	-	-
Arthur S. Hall	Brewster	2	-					
T. W. Holway	Chatham	1	2	420 00	-	-	30	700 00
Daniel W. West	Chilmark	3	5					
Ernest C. Flanders	Chilmark	2	5					
Rasmus Klimm	Chilmark	1	1	4,895 00	7	1,700 00	2	120 00
James A. Mayhew	Chilmark	2	3					
Welcome L. Tilton	Chilmark	2	4					
T. and J. Buslacchi	Dennis	9	4					
Harry Hall	Dennis	L	L	360 00	2	3,000 00	16	240 00
George E. Hall	Dennis	L	L					
Daniel C. Jennings	Falmouth	3	4	1,769 00	1	1,500 00	-	-
Charles D. Cowan	Fairhaven	3	2					
Joseph S. Machado	Fairhaven	2	2					
Joseph B. Goulart	Fairhaven	3	5	1,325 00	5	2,100 00	-	-
Frederick A. Pease	Fairhaven	2	4					

## Returns from the Shore Net and Pound Fisheries for the Year 1921 — Concluded.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pounds.	Value.	Number of Nets.	Value.
Henry W. Nelson	Gloucester	2	3	\$2,055 00	-	-	1	\$60 00
Alfred Anderson	Gloucester	2	5	-	-	-	-	-
Frank C. Hodgkins	Gloucester	2	2	-	-	-	-	-
Charles F. Tarr	Gloucester	1	4	-	-	\$3,200 00	-	-
George M. Gray	Gosnold	9	6	3,320 00	2	-	-	-
Marine Biological Laboratory	Gosnold	9	6	-	-	-	-	-
Edward W. Heath	Manchester	2	-	-	-	-	-	-
Henry C. Phillips	Marshfield	2	2	530 00	-	-	1	25 00
Warren P. Taylor	Nahant	1	1	125 00	-	-	-	-
Arthur J. Barrett	Nantucket	10	12	4,300 00	3	4,000 00	155	4,200 00
Arthur McCleave	Nantucket	2	6	-	-	-	-	-
Lawrence H. Allen	Newburyport	2	-	-	-	-	-	-
Charles A. Caswell	Newburyport	2	-	-	-	-	-	-
Manuel Avilla	New Bedford	1	-	-	-	-	-	-
George A. Finney	Plymouth	2	4	190 00	1	300 00	-	-
A. L. Daggett	Provincetown	4	5	-	-	-	-	-
Manuel D. James	Provincetown	2	2	-	-	-	-	-
John Johnson	Provincetown	3	1	5,755 00	2	1,000 00	270	3,400 00
Levi A. Kelley	Provincetown	1	1	-	-	-	-	-
William B. Lewis	Provincetown	8	5	-	-	-	-	-
Edwin Williams	Raynham	14	2	400 00	-	-	-	-
George W. Dunn	Salem	2	3	-	-	-	-	-
Charles P. R. Fellows	Salem	1	2	1,090 00	-	-	16	240 00
Anthony J. Gonet	Salem	3	3	-	-	-	-	-





*Number of Pounds of Fish taken*

TOWN.	Alewives.	Bluefish.	Flounders.	Mackerel.	Menhaden.	Pollock.	Scup.	Sea Bass.
Barnstable . . .	-	-	-	111,770	-	-	157	-
Beverly . . . .	-	-	12,150	-	-	-	-	-
Brewster . . . .	48,800	-	-	-	-	-	-	-
Chatham . . . .	-	-	-	4,550	-	-	-	-
Chilmark . . . .	10,150	-	141,336	5,000	2,200	-	2,320	52
Dennis . . . . .	-	-	206	2,227	-	-	9,000	-
Falmouth . . . .	12,808	-	125	401	16,937	-	3,211	-
Fairhaven . . . .	12,000	472	7,018	1,048	32,555	-	175	-
Gloucester . . . .	3,500	521	34,613	23,382	-	6,000	-	-
Gosnold . . . . .	-	945	644	4,778	5,958	10	4,867	27
Manchester . . . .	2,400	-	-	5,585	3,000	67,890	-	-
Marshfield . . . .	500	-	-	-	-	-	-	-
Nahant . . . . .	-	-	-	-	-	-	-	-
Nantucket . . . .	28,600	100	18,575	37,700	-	-	3,700	1,050
Newburyport . . .	-	-	-	-	-	-	-	-
New Bedford . . .	-	-	-	-	-	-	-	-
Plymouth . . . . .	-	-	-	7,622	-	-	-	-
Provincetown . . .	-	-	150,500	109,411	-	-	-	-
Raynham . . . . .	78,110	-	-	-	-	-	-	-
Salem . . . . .	-	-	5,738	-	-	-	-	-
Sandwich . . . . .	-	-	-	226	-	-	-	-
Scituate . . . . .	-	-	-	287	2,000	-	-	-
Truro . . . . .	-	-	-	-	-	-	-	-
Tisbury . . . . .	15,177	648	2,380	10,923	19,517	64	42,853	223
Westport . . . . .	-	-	310	-	-	-	-	-
Winthrop . . . . .	-	-	-	-	-	-	-	-
Yarmouth . . . . .	-	-	35,880	18,699	-	-	-	-
Totals . . . . .	212,045	2,686	409,469	343,589	82,167	73,964	66,283	1,352

*in Pounds, Nets, Traps, etc., 1921.*

Sea Herring.	Shad.	Squeteague.	Striped Bass.	Squid.	Tautog.	Other Edible or Bait Spe- cies.	Lobsters.	Total Pounds.	Total Value.
-	-	15	8	199,925	20	38,445	2,404	352,744	\$17,639 20
-	-	-	-	-	-	12,850	30,246	55,246	8,241 38
-	-	-	-	-	-	-	-	48,800	304 00
-	-	-	-	-	-	-	21,861	26,891	8,093 32
-	-	220	-	-	-	6,700	373,287	541,265	59,500 96
-	-	-	-	101,600	300	-	8,617	121,944	2,399 34
-	-	-	-	16,794	5,239	730	56,445	112,690	10,383 07
1,482	16	4	37	52,360	7,366	22,652	13,725	150,910	4,894 65
16,000	-	-	-	8,000	-	48,220	89,037	229,273	28,216 54
2,478	-	39	-	36,750	7,290	10,064	470,425	544,275	64,527 73
4,164	-	-	-	1,971	-	29,315	458	114,783	5,706 03
-	-	-	-	-	-	1,200	110,356	112,056	22,780 78
-	-	-	-	-	-	725	28,842	29,567	8,334 79
600	-	-	-	6,000	-	122,000	28,753	247,078	16,150 28
-	-	-	-	-	-	10,605	-	10,605	1,180 94
-	-	-	-	-	171	1,078	138,004	139,253	7,647 08
-	-	-	-	-	-	1,640	202,072	211,334	35,240 93
-	-	-	-	20,715	-	21,773	61	302,460	28,883 30
188	-	-	-	-	-	-	-	78,298	1,787 00
-	-	-	-	-	-	18,330	9,202	33,270	4,170 04
-	48	-	4,748	4,500	24	4,273	8,947	22,766	3,125 41
100	-	-	-	-	-	100	208,843	211,230	35,102 80
-	-	-	-	-	-	-	1,096	1,096	728 50
-	9	413	-	89,853	356	21,269	29,712	243,397	14,944 07
-	-	-	-	-	70	-	116,896	117,276	16,247 28
-	-	-	-	-	-	68,400	-	68,400	513 00
-	-	-	-	-	-	5,505	2,812	62,896	17,624 25
25,012	73	691	4,793	538,468	20,836	445,874	1,962,101	4,189,403	\$424,366 67

*Returns from Lobster Fisheries, 1921.*

["S" indicates that the proprietor was also engaged in shore fisheries to a greater extent than lobster fishery. Information will be found in the table entitled "Returns from the Shore Net and Pound Fisheries for the Year 1921."]

Proprietor.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
C. W. Crosby	Barnstable	2	2						
Nelson B. Marchant	Barnstable	2	3						
Wilnot Marchant	Barnstable	1	1					\$918 55	115
Walter H. Sherman	Barnstable	1	1	\$1,980 00	111	\$243 00	2,280		
George W. Sturgis	Barnstable	S	1						
Harry C. Hannable	Beverly	1	1						
William R. Weeks	Beverly	1	1						
Hornee Clark	Beverly	1	1						
George Wm. Wise	Beverly	1	1						
Henry P. Kennison	Beverly	1	1						
Warland Hersey	Beverly	1	1						
Arthur Daigle	Beverly	1	1						
Nelson A. Southwick	Beverly	6	2						
William Bouchard	Beverly	1	1	907 00	514	1,157 00	20,164	6,744 38	216
David Bouchard	Beverly	1	1						
Luther A. Cahoon	Beverly	1	1						
Charles A. Davis	Beverly	1	1						
Carl W. Foster	Beverly	1	1						
John A. Gray	Beverly	1	1						
Stephen M. Richards & Son	Beverly	S	S						
Joseph Julius	Beverly	1	1						
Joseph P. Serrilla	Boston	1	2						
Tony Sozza	Boston	1	1	890 00	215	176 00	14,040	3,845 39	154
John Thomas	Boston	1	1						
Charles F. Benson	Bourne	1	2						
Allan B. Bourne	Bourne	1	1						
Joseph M. Butts	Bourne	1	1						
Paul D. Gibbs	Bourne	3	2						
D. H. MacGillivray	Bourne	1	1	3,650 00	452	1,430 00	22,008	5,856 28	312
Albert A. Nightingale	Bourne	1	2						
Alvin E. Nightingale	Bourne	1	1						





## Returns from Lobster Fisheries, 1921 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Benjamin H. Sisson . . . . .	Chilmark	1	1						
Percy G. Tilton . . . . .	Chilmark	1	1						
Frank P. Tilton . . . . .	Chilmark	1	1						
W. L. Tilton . . . . .	Chilmark	S	S						
William S. Tilton . . . . .	Chilmark	2	1						
Daniel Vincent . . . . .	Chilmark	1	1						
Carl J. Vigfors . . . . .	Chilmark	1	2						
Joseph M. Silvia . . . . .	Cohasset	1	1						
Andrew Peterson . . . . .	Cohasset	1	1						
Luther J. Litchfield . . . . .	Cohasset	1	1						
Louis J. Figueiredo . . . . .	Cohasset	1	1						
Antone S. Figueiredo . . . . .	Cohasset	1	1						
George F. Ainslee . . . . .	Cohasset	1	1						
William S. Douglas . . . . .	Cohasset	1	1						
John Elman . . . . .	Cohasset	1	2						
John D. Golden . . . . .	Cohasset	1	2						
Patrick Grassie . . . . .	Cohasset	1	1	\$4,694 00	1,345	\$4,320 00	34,967	\$12,654 36	177
Henry B. Kimball . . . . .	Cohasset	1	2						
William R. Reid, 3d . . . . .	Cohasset	1	2						
Bernard J. Salvador . . . . .	Cohasset	1	10						
Manuel E. Salvador . . . . .	Cohasset	1	1						
Carl C. Labree . . . . .	Cohasset	1	1						
John C. Figueiredo . . . . .	Cohasset	1	1						
Ralph S. Place . . . . .	Cohasset	1	1						
Cornelius Murphy . . . . .	Cohasset	1	2						
Arno Peterson . . . . .	Cohasset	1	1						
Joseph J. Merciel . . . . .	Dartmouth	1	1	290 00	225	160 00	6,056	2,979 81	91
Robert H. Murdy . . . . .	Dartmouth	1	1						
Manuel Oliveira . . . . .	Dartmouth	1	1						
Oscar Gibbs . . . . .	Dennis	1	1						
Harry Hall . . . . .	Dennis	1	1						
George E. Hall . . . . .	Dennis	1	1						
Obed H. Shiverick . . . . .	Dennis	2	2	500 00	345	370 00	5,745	2,282 05	257
P. W. Tucker . . . . .	Dennis	1	2						
Benjamin Walker . . . . .	Dennis	1	2						

Robert Cushman	Duxbury	1	2	215 00	75	225 00	2,705	946 75	32
Levi Jackson	Edgartown	3	1	4,000 00	150	500 00	12,300	3,036 00	200
Henry O. Daniels	Eastham	1	1	50 00	22	25 00	225	170 10	16
Luther M. Ryder	Eastham	1	1						
E. H. Burnham	Essex	1	1	100 00	25	25 00	400	165 00	10
Cyrille L. Allan	Fairhaven	1	1						
Candy Brown	Fairhaven	1	1						
Domingo Brown	Fairhaven	1	2						
Joseph Brown	Fairhaven	1	1						
Charles W. Cook	Fairhaven	1	2						
Peter Fantaie	Fairhaven	1	1						
J. B. Goulart	Fairhaven	2	2	981 40	530	1,131 25	13,668	2,737 32	389
Joseph S. Machado	Fairhaven	2	2						
Frederick A. Pease	Fairhaven	2	2						
John Pauline	Fairhaven	2	2						
Gaspard Souza	Fairhaven	1	1						
Manuel Brown	Falmouth	1	1						
James F. Cook	Falmouth	1	1						
C. M. Fisher	Falmouth	1	1						
Charles R. Grinnell	Falmouth	1	3						
Alfred M. Hilton	Falmouth	1	1						
Daniel C. Jennings	Falmouth	2	2						
Walter A. Johnson	Falmouth	1	1						
Joseph Joseph	Falmouth	1	1						
William P. Megathlin	Falmouth	1	1						
Francis Minot	Falmouth	2	3	22,925 00	1,067	2,507 50	37,630	8,941 74	793
Walter E. Nickerson	Falmouth	1	1						
Frank V. Peterson	Falmouth	1	1						
Lewis S. Peterson	Falmouth	1	1						
Emanuel G. Serpa	Falmouth	1	1						
Prince M. Stuart	Falmouth	1	1						
Milburn C. Stuart	Falmouth	1	2						
Albert C. Swain, Jr.	Falmouth	1	2						
Robert N. Veeder	Falmouth	1	1						
Arthur S. Weeks	Falmouth	1	2						

## Returns from Lobster Fisheries, 1921 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Grover O. Ryan	Gay Head	1	2						
Edward D. Robinson	Gay Head	1	2						
Francis Manning and Walter Manning	Gay Head	2	2						
Alonso V. Smalley and Leander B. Smalley	Gay Head	2	2						
Granville M. Delain	Gay Head	1	3						
David P. Bosworth	Gay Head	1	2						
Samuel F. Smalley	Gay Head	1	1						
Joseph H. Lang	Gay Head	1	2						
Marshall Jeffers	Gay Head	1	1						
Harrison L. Vanderhoop	Gay Head	1	2						
Russell C. Smalley	Gay Head	1	2						
Moses P. Cooper and George W. Cooper	Gay Head	2	2	\$6,727 00	1,550	\$4,977 50	92,120	\$20,603 12	1,034
August Reinertson	Gay Head	1	2						
Nathan A. Francis	Gay Head	1	2						
Lester A. Bowman	Gay Head	3	2						
Charles W. Ryan	Gay Head	1	2						
Benjamin J. Attacquin	Gay Head	1	2						
Thomas C. Jeffers and William M. Marden	Gay Head	2	1						
Charles H. Ryan	Gay Head	1	4						
Napoleon B. Madison	Gay Head	2	2						
Linus S. Jeffers	Gay Head	3	3						
Amos P. Smalley	Gay Head	1	1						
Alonso S. Robinson	Gay Head	2	3						
Edward L. Ashley	Gloucester	1	1						
Enoch Buriso	Gloucester	1	1						
F. Balcione and F. E. Merslant	Gloucester	2	1						
Frank B. Brewer	Gloucester	1	1						
Clarence Davis	Gloucester	1	2						
William H. Foye	Gloucester	1	1						
William Enos	Gloucester	1	1						
William Enos, Jr.	Gloucester	1	1						
Joseph A. Goodwin	Gloucester	1	1						





## Returns from Lobster Fisheries, 1921 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Joseph S. Dutra, Jr.	Gosnold	1	2						
William F. Elias	Gosnold	1	2						
Antone R. Everett	Gosnold	1	2						
Candido R. Freitas	Gosnold	1	2						
Miguel J. Gousaloes	Gosnold	1	2						
James F. Hunt	Gosnold	2	2						
J. P. Janson	Gosnold	1	1						
Clarence King	Gosnold	1	1						
Jan Kolaczewski	Gosnold	1	1						
George C. King	Gosnold	1	2						
John Lewis	Gosnold	1	1						
John A. MacKay	Gosnold	1	2	\$24,648 00	6,181	\$16,897 00	313,617	\$62,571 32	5,455
John Arvad Olsen	Gosnold	1	1						
Manuel Perry	Gosnold	1	1						
Victor Perry, Jr.	Gosnold	1	1						
Modest Kakowski	Gosnold	1	2						
Manuel King Rose	Gosnold	1	2						
Russell W. Rotch	Gosnold	1	2						
Louis J. Ramos	Gosnold	2	2						
Benjamin E. Stuart	Gosnold	2	3						
Robert R. Tilton	Gosnold	1	1						
Charles W. Tilton	Gosnold	2	2						
Alpheus P. Tilton	Gosnold	1	1						
Isaiah C. Tilton	Gosnold	1	1						
Frank B. Veeder and Carlton L. Veeder	Gosnold	3	3						
Jared L. Vincent	Gosnold	2	1						
John Violet	Gosnold	2	1						
John Ziminski	Gosnold	1	1						
Ernest Gregory and Joseph Souza	Gosnold	2	2						
Benjamin A. Atwood and Robert Crawford	Hingham	2	2	781 00	225	563 75	7,061	2,368 91	60
Eben F. Hersey	Hingham	1	1						
Charles A. Bridgham	Hingham	1	2						



## Returns from Lobster Fisheries, 1921 — Continued.

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Walter E. Bowman . . . . .	Mattapoissett	1	2						
David Brownell, Jr. . . . .	Mattapoissett	1	1						
Henry V. Davis . . . . .	Mattapoissett	1	1						
Charles A. Bowman . . . . .	Mattapoissett	1	2						
Nathaniel Perry Nye . . . . .	Mattapoissett	1	2						
William H. Kinney . . . . .	Mattapoissett	1	1	\$2,045 00	229	\$868 75	4,410	\$1,302 84	162
William J. Kerwin . . . . .	Mattapoissett	1	1						
Albert D. Peters . . . . .	Mattapoissett	1	1						
William H. Raymond . . . . .	Mattapoissett	1	1						
Frederick W. Termilegar . . . . .	Mattapoissett	1	1						
Edward E. Wood . . . . .	Mattapoissett	1	1						
Harry Smith . . . . .	Marion	1	1	500 00	43	65 00	1,279	329 50	27
Philip Leger . . . . .	Marion	1	1						
Henry C. Phillips . . . . .	Marshfield	2	2						
I. H. Bourne . . . . .	Marshfield	1	1						
Oscar A. Chandler . . . . .	Marshfield	2	3						
P. J. Donovan . . . . .	Marshfield	2	2						
W. N. Englested . . . . .	Marshfield	2	2						
Frank E. Harlow . . . . .	Marshfield	1	3						
Charles H. Newton . . . . .	Marshfield	3	3						
R. L. Newton . . . . .	Marshfield	3	3						
C. H. Peterson . . . . .	Marshfield	1	2						
C. E. Peterson . . . . .	Marshfield	1	2						
Albert Rogers . . . . .	Marshfield	3	2						
William E. Tyler . . . . .	Marshfield	1	1						
C. H. Newton, Sr. . . . .	Marshfield	3	3						
Ellet S. Publicover . . . . .	Marshfield	1	2	10,605 00	2,058	5,460 50	71,871	22,073 78	404
Lyman Sears . . . . .	Marshfield	1	2						
H. W. Tolman . . . . .	Marshfield	1	2						
Warren J. Kent . . . . .	Marshfield	1	2						
Wilfred Keane . . . . .	Marshfield	1	1						
A. H. Taylor . . . . .	Marshfield	1	1						
Epiphanius Pierce . . . . .	Marshfield	1	2						
Melvin F. Ewell . . . . .	Marshfield	1	2						





*Returns from Lobster Fisheries, 1921 — Continued.*

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Stratis Bozas . . . . .	New Bedford	1	1						
Manuel Brown . . . . .	New Bedford	1	1						
John Cassidy . . . . .	New Bedford	2	1						
Lucas Daigle . . . . .	New Bedford	1	—						
Joseph Pereira . . . . .	New Bedford	1	2						
Victorina P. Furtado . . . . .	New Bedford	1	2						
Manuel George . . . . .	New Bedford	1	1						
Constantine and John Karamoulidis . . . . .	New Bedford	2	1						
Charles P. Mattison . . . . .	New Bedford	1	2						
Nickolas Martin . . . . .	New Bedford	1	1						
Antone B. Mella . . . . .	New Bedford	1	1						
Joseph P. Mello . . . . .	New Bedford	1	1						
Antone Miguel . . . . .	New Bedford	—	—						
Roman Rusin . . . . .	New Bedford	1	1						
Augusto Ribeiro . . . . .	New Bedford	1	1						
Manuel F. Sylvia . . . . .	New Bedford	1	2						
Bartholomew Sylvia . . . . .	New Bedford	2	2						
Manuel E. Sylvia . . . . .	New Bedford	1	2						
Antone Sylvia . . . . .	New Bedford	2	2						
Edward A. Sylvia, Jr. . . . .	New Bedford	2	2						
Antone E. Sylvia . . . . .	New Bedford	2	2						
Edward A. Sylvia . . . . .	New Bedford	1	2						
Joseph Lima . . . . .	New Bedford	2	2						
Augusto Souza . . . . .	New Bedford	1	2						
Manuel Vieira . . . . .	New Bedford	2	2						
Charles H. Bates . . . . .	Norwell	1	1	20 00	15	37 50	263	105 00	3
Lincoln S. Bates . . . . .	Norwell	1	1						
Warren P. Alexander . . . . .	Plymouth	1	1						
Russell W. Anderson . . . . .	Plymouth	1	1						
Thomas H. Andrews . . . . .	Plymouth	1	2						
E. H. Arnold . . . . .	Plymouth	1	2						
Edwin H. Bartlett . . . . .	Plymouth	1	2						
George M. Besse . . . . .	Plymouth	1	1						
George L. Binney . . . . .	Plymouth	1	2						

[illegible]

## Returns from Lobster Fisheries, 1921 — Continued.

THOMPSTON.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Joseph C. Nickerson	Plymouth	1	1						
Wallace K. Nightingale	Plymouth	1	1						
Wallace J. Nightingale	Plymouth	1	1						
Markus Peiffer	Plymouth	1	1						
Albert F. Pierce	Plymouth	1	2						
Charles H. Pierce	Plymouth	1	2						
Hugh Platt	Plymouth	1	1						
Nathan W. Pratt	Plymouth	1	1						
Harry N. Spencer	Plymouth	1	1						
John A. Starks	Plymouth	1	1						
Lawrence A. Richardson	Plymouth	1	1						
Lester Richardson	Plymouth	1	1						
Charles W. Raymond	Plymouth	1	1						
Robert Richardson	Plymouth	1	1						
Augustus B. Rogers	Plymouth	1	2						
H. A. Ryder	Plymouth	1	2						
Nathan L. Sampson	Plymouth	1	3						
Harry L. Sampson	Plymouth	1	2						
Charles W. Sampson	Plymouth	1	2						
Frank Simmons	Plymouth	1	2						
B. W. Smith	Plymouth	1	1						
Volney L. Thompson	Plymouth	1	1						
Daniel C. Town	Plymouth	1	1						
Dennis P. Ward	Plymouth	1	2						
James S. A. Valler	Plymouth	1	1						
Belham Whiting	Plymouth	1	2						
Daniel E. Wood	Plymouth	1	1						
William L. Russell, Jr.	Plymouth	1	1						
Alfred T. Mayo	Provincetown	S	S	\$	12	\$12 00	61	\$48 80	5
John I. Bennett	Quincy	1	1	\$250 00	110	190 00	1,677	918 80	62
Guy F. Harvey	Quincy	1	1						
Charles W. Smith	Revere	1	1	500 00	100	500 00	200	10 75	65
Arthur H. Gibbs	Sagamore	1	1	28 00	19	20 00	450	180 00	9





*Returns from Lobster Fisheries, 1921 — Concluded.*

PROPRIETOR.	Town.	Number of Men.	Number of Boats.	Value.	Number of Pots.	Value.	Number of Lobsters.	Value.	Number of Egg Lobsters.
Richard Wherity	Scituate	1	1						
Frank H. Young	Scituate	1	1						
Harry Driscoll	Scituate	1	1						
John F. Driscoll	Scituate	1	1						
Edward R. Tobin	Scituate	1	1						
Moses H. Jellows	Scituate	1	1						
Samuel Smith	Scituate	1	1						
James W. Welch	Scituate	1	2						
Christopher O'Neill	Scituate	1	1						
David F. Fraser	Scituate	1	1						
Albert E. Reed	Scituate	1	2						
John F. Dwight	Scituate	1	1						
Christopher O'Neill, Sr.	Scituate	1	1						
John T. Fallon	Scituate	1	1						
Fred A. Conroy	Scituate	1	1						
John F. Cushman	Scituate	1	1						
Gilbert J. Patterson	Scituate	1	1						
James L. McCarthy	Scituate	1	1						
Joseph Flynn	Scituate	1	1						
Leonard N. Rhodes	Scituate	1	2						
Leo Hatch	Scituate	1	4						
James J. O'Hern	Scituate	1	1						
Richard Gargon	Scituate	1	1						
Charles B. Cleveland	Tisbury	1	-						
Edward W. Cleveland	Tisbury	1	2						
Morris F. Cleveland	Tisbury	3	2	\$2,620 00	438	\$1,057 00	26,475	\$6,123 67	1,210
William Look	Tisbury	1	-						
Ellis Luce	Tisbury	2	3						
Lester D. Mayhew	Tisbury	1	1						
Nathaniel O. Atwood	Truro	1	2						
Joseph A. Cobb	Truro	1	1	103 00	92	106 25	731	567 50	24
Manuel C. Francis	Truro	1	1						







The Commonwealth of Massachusetts

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ANNUAL REPORT

OF THE

DIVISION OF FISHERIES AND GAME

FOR THE

YEAR ENDING NOVEMBER 30, 1922

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DEPARTMENT OF CONSERVATION



BOSTON

WRIGHT & POTTER PRINTING CO., STATE PRINTERS  
32 DERNE STREET



The Commonwealth of Massachusetts

ANNUAL REPORT

*Mass.: Department of Conservation;*  
DIVISION OF FISHERIES AND GAME

FOR THE

YEAR ENDING NOVEMBER 30, 1922

DEPARTMENT OF CONSERVATION



PUBLICATION OF THIS DOCUMENT

APPROVED BY THE

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BOSTON

WRIGHT & POTTER PRINTING CO., STATE PRINTERS  
32 DERNE STREET

JUN 7 1892

STATE HOUSE, BOSTON

## DEPARTMENT OF CONSERVATION.

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### Commissioner.

WILLIAM A. L. BAZELEY.

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## DIVISION OF FISHERIES AND GAME.

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### Director.

WILLIAM C. ADAMS.

### Inspector of Fish.

ARTHUR L. MILLETT.

### Secretary.

MISS L. B. RIMBACH.

### Chief Fish and Game Warden.

ORRIN C. BOURNE.

### License Clerk.

W. RAYMOND COLLINS.

### Supervisor of Distributions.

JAMES A. KITSON.

### Biologist.

DAVID L. BELDING.

OFFICE: Room 506, State House, Boston, Mass.



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## The Commonwealth of Massachusetts

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The Director of Fisheries and Game herewith presents the fifty-seventh annual report.

### GENERAL CONSIDERATIONS.

In the early days of American colonial life ample opportunity was offered to the settlers to hunt and fish on the large areas of unoccupied territory. Through the years, population has increased rapidly and today there is comparatively little wild land in the United States. Under our democratic form of government the owner of the land has complete control over it, subject to the police powers of the State, and can determine who shall come on to it, and for what purpose. With the growth in population and the formation of large communities, the relation of the landowner to the non-landowner presents interesting problems of adjustment. Among these is the one of the respective rights of all the citizens to pursue and take wild life. In Massachusetts, for example, the upwards of eight thousand square miles of territory is owned by a comparatively small portion of the population. The wild life on that land, however, in the eyes of the law belongs to all the citizens of Massachusetts. What, then, shall be the rights of the large population of non-landowners to pursue and take that which is the property of all the citizens?

The small number of landowners may lawfully exclude all the rest of the citizens from coming on their land to hunt and fish. In a given season the State may substantially stock a given section with game and fish raised with funds contributed by all the taxpayers. Yet there is nothing in the law to prevent the owner of the land thus stocked from posting it to exclude the public at large, and rent the shooting privilege to any person who will pay the price. Practically the only exception to the state of affairs cited is in respect to the great ponds of the Commonwealth, on which the Constitution guarantees free boating, fowling and fishing forever. The generous attitude of the land owners in the past has deferred the facing of a problem which sooner or later will have to be solved.

The State licenses give the purchasers the right to hunt and fish according to law. The law permits fishing on unnavigable streams and hunting in the covers *only* in case the land owner is willing. To push the argument to its logical conclusion, it is conceivable that the time may come when these rights to hunt and fish may be sufficiently valuable (at least in favorable localities) so that those wishing to enjoy these sports will have to compensate the land owner in addition to paying the license fees.

Annually a substantial sum is expended by the State to restock the covers and waters, building up a permanent stock of wild life. This is being done more and more with the funds voluntarily provided by the hunters and fishermen who pay the license fees. But the work is proceeding without the adoption of suitable guarantees or proper provision that these expenditures will inure to the lasting benefit of those supporting it. In our opinion these safeguards can best be set up by establishing annually with a portion of the fees, public shooting and fishing grounds to be open to the citizens of the Commonwealth for all time. In connection with these there should be permanent sanctuaries where such native species as the grouse, quail, pickerel, etc., which experience has shown are not easily propagated, may breed naturally under favorable conditions.



There are many other uses to which the same areas could properly be put without conflicting with the main purposes. Some lands during the summer months might well be used for camping and other recreational purposes not inconsistent with the breeding seasons. On sizeable tracts reforestation could be carried on to advantage. All the areas could be reasonably open to wild life observers. The foregoing only hints at possibilities; but the essential thing is to reveal the lack of protection existing under present laws, to the annual investment, and to indicate what should be done to provide for all time a net-work of public shooting grounds, bird sanctuaries and public recreation grounds in general. A "back to the land" movement is today discernible in our people. An increasing value is placed on the many benefits of all kinds of outdoor sports. It will never be possible to make this plan a reality at a less cost than today.

#### ANNUAL REPORT.

The law in respect to reports to be made by State officials prescribes that they shall consist of "a brief summary of the year's work, with recommendations for the succeeding fiscal year." The radical change in plan and volume of this report is made to conform to the law.

#### PERSONNEL.

There were no changes in departmental officials.

#### FINANCES.

	Appropriations.	Expenditures.	Balances.
For salaries and maintenance . . . . .	\$208,000 00	\$205,063 92	\$2,936 08
For special purposes . . . . .	11,950 00	11,229 77	720 23
Available from 1921 balances . . . . .	2,500 00	2,500 00	-
	\$222,450 00	\$218,793 69	\$3,656 31
Balances available for next year . . . . .	-	-	691 57
Returned to general treasury . . . . .	-	-	\$2,964 74

The impression has prevailed that the revenue from fines and from the license fees has been sufficient to support our work. Without marshalling the figures it is sufficient to say that this revenue has provided about fifty per cent of actual expenditures since 1909 when the license law went into effect. The State government is constantly on the alert to discover additional revenues. The most modern thought is that activities more or less recreational should be nearer self-supporting; hence the doubling of the hunting and fishing license fees last year. It is to the great credit of those who buy licenses that this was accepted without protest, and it gave an increase in revenue in 1922 of \$66,415.65 over that of the preceding year. The law requires that all money received from any source whatever shall be paid into the general treasury, and disbursed on a budget system. The income from the license fees is not specifically set aside for our use. But the voluntary acceptance by the sportsmen of the increased fees, while not a controlling factor, would naturally be taken into consideration by the legislature in determining the annual appropriation.

The revenue turned into the State treasury was: license fees (see details below), \$178,599.80; sales at game farms and fish hatcheries, \$230.53; sales of game tags, \$39.65; sale of forfeited goods, \$115.15; lease of Chilmark Pond, \$75; lease of clam flats, \$10; total, \$179,070.13.

There are 17 different kinds of licenses for hunting and fishing. Condensed into 4 general classes the returns show:

	Total Number issued.	Gross Value.	Fees to Clerks.	Net Return to State.
Combination licenses . . . . .	63,861	\$115,128 75	\$9,578 85	\$105,549 90
Hunting licenses . . . . .	22,537	30,559 50	3,381 00	27,178 50
Fishing licenses . . . . .	49,503	52,351 50	7,425 30	44,926 20
Lobster licenses . . . . .	1,112	1,112 00	166 80	945 20
	137,013	\$199,151 75	\$20,551 95	\$178,599 80

#### CONFERENCES.

The yearly conferences with the sportsmen, at which are made public and discussed the Division's proposed recommendations for new legislation, were held in January at Middleborough, Worcester, Springfield and Pittsfield, as well as Boston, to give as wide a representation as possible. The small attendance and little criticism advanced apparently indicated general satisfaction with existing conditions.

In March a conference of the wild fowl gunning interests was called, made timely by current criticisms in the press to the effect that the sport is being commercialized and excessive numbers of ducks and geese taken at the gunning stands. Though every opportunity was given for the opposition to be heard, apparently public sentiment was not greatly aroused. While it is a fact that the numbers taken exceeded the totals of other years, it is equally true that under federal protection ducks and geese are appearing in greatly increased numbers on their migrations through the State.

#### ACTIVITIES OUTSIDE THE STATE.

The Director attended the meeting of the Game Breeders' Association of the American Game Protective and Propagation Association; of the Advisory Committee to the Department of Agriculture on the Migratory Bird Treaty Act; of the International Association of Game, Fish and Conservation Commissioners; and of the American Fisheries Society.

#### COURTESIES.

We acknowledge with a full realization of their value, the co-operation and many courtesies received from individuals, associations and agencies of various kinds, of which the demands of brevity make detailed mention impossible.

#### ENFORCEMENT OF LAWS.

##### COURT WORK.

Law enforcement was conducted in substantially the same manner as in previous years, and a larger number of court cases handled than last year, with no increase in the number of wardens.

Number of cases, 544; convicted, 517; discharged, 27; (filed, 113; appealed 7); fines imposed, \$6,099; costs paid, \$82. This does not take into consideration the cases presented to the Federal courts through the Federal warden, evidence for which was secured by the State wardens.

Licenses revoked: resident combination, 81; resident fishing, 39; resident hunting, 16; non-resident fishing, 1; alien hunting, 1; alien fishing, 4; total, 142.

The crusade against infractions of the lobster laws was continued and 65 cases, with \$1,385 in fines, brought to court. Handling of short lobsters and unlicensed fishing are the commonest offences against the lobster laws. Regular inspections were made of shipments received at Boston from Nova Scotia, and 10,816 short lobsters seized therefrom were liberated. Due to lack of funds and a question as to the advisability of the procedure, no egg-bearing lobsters were purchased from dealers and fishermen.

There were 13 prosecutions against aliens for unlawful possession and use of firearms, with fines of \$500. Fifteen shot guns and rifles thus unlawfully possessed were confiscated.

Despite two years of wide publicity of the requirements of the fishing license law, 130 persons were apprehended for fishing without a license with fines of \$1,070. For the companion offence of hunting without a license there were only 51 cases with \$465 in fines.

A particular drive was made to stamp out the practice among foreign-born persons of killing song and insectivorous birds, resulting in 34 cases with \$590 in fines.

Among violations of the fishing laws, taking short trout, 16 cases with fines \$190, and taking short pickerel, 37 cases and fines of \$103, took the lead.

Breaches of the trapping laws led to 33 cases in court and \$315 in fines.

The warden force worked closely in touch with the U. S. Biological Survey in enforcing the federal migratory bird laws, our wardens being likewise U. S. Deputy Game Wardens. Particular attention was given to patrol of the coastal districts during the open season on shore birds.

#### EQUIPMENT.

The gift of two Ford cars by the sportsmen and individuals in and about Mansfield and by the Bay State Sportsmen's Association of Lynn; the contribution toward the purchase of a car of \$150 by the Cape Cod Fish and Game Association of Falmouth; and the purchase of four new Ford cars with State funds, gives the warden force 9 state-owned and 15 privately owned cars at its disposal for patrol work. Though this represents a definite improvement, complete motorization of the force is needed for complete efficiency.

A 28-foot hull with good speed lines was purchased, and on the installation of a high-grade motor this will give a small, fast boat for coping with violations in the harbors, bays and rivers.

#### LEGISLATION.

Recommendations for legislation are to be found in the Appendix.

### EDUCATION AND PUBLICITY.

The publicity work was handled principally by the law-enforcement organization. Illustrated lectures covering various phases of propagation and conservation work have taken a great deal of time and effort on the part of the officials. Wardens have done similar work in their districts, devoting considerable attention to the school children.

With one exception the exhibits at the county fairs, made for a number of years past, were discontinued. These fairs come at the season when wardens are urgently needed for patrol work; exhibits are of necessity practically identical from year to year; and the labor and expense is great. It was felt, on the whole, that the money could be used to better advantage in other lines of publicity. The results of the educational work which has been carried on since 1916 have been distinctly and unquestionably evident in the last couple of years.

### BIOLOGICAL DEPARTMENT.

This year the direction of the distribution of the hatchery products was taken over by the biological department, this being recognized more and more as time goes on as a purely biological problem. (See Fish and Game Distribution.)

Further studies were made relative to the pathology, etiology and epidemiology of fish diseases, particularly the epidemic forms. Examination was made of specimens of "jellied" swordfish in connection with the work of the Inspector of Fish; and outbreaks of disease or unusual conditions at the hatcheries, were studied and treated.



In addition to routine pathological examination of diseased birds, autopsies were performed on water fowl killed by the oil wastes which pollute the coastal waters. (See Pollution.)

A survey of the Aberjona River was completed and the effects upon fish life of certain chemicals connected with paper mill wastes were studied. (See Pollution.)

Biological surveys were made of the Parker and the Ipswich rivers, with special reference to development of the fisheries therein.

Observations were continued in regard to the methods of improving the alewife fishery; the newly opened spawning grounds at the headwaters of the Taunton River were stocked with mature alewives; data collected concerning present conditions and the year's run for the various alewife fisheries. (See Marine Fisheries, Alewives.)

Considerable progress has been made in fishway installation. (See Fishways.)

A survey of the condition of the clam, oyster, scallop and quahaug fisheries, similar to the survey of 1909, was completed, with special attention to the changes which have taken place during that time. (See Marine Fisheries, Mollusks.)

## WILD BIRDS AND ANIMALS.

### WINTER FEEDING.

The winter of 1921-1922 was, on the whole, an open one, and easy on the game. The storm of Nov. 27-28, 1921, which coated the inland portions of the State with tons of ice, while wrecking the trees badly was not of sufficient duration to work wholesale havoc with the larger birds. The smaller ones apparently perished in large numbers through food scarcity in the period following. As emergency rations for the ground feeding birds 330,020 pounds of scratch feed were sent out for distribution through wardens, boy and girl scouts, rural mail carriers, associations, individuals and other agencies.

### BREEDING SEASON.

The spring and early summer was marked by an abnormal amount of rainfall. May was wet and cold; June and July a period of almost continuous rain, the June storms rather cold but with the warmer weather of July modifying the severity of its rain. This condition, though with local variations, prevailed generally over the State. It was feared that these conditions in the nesting and rearing season would wipe out the season's hatch, but far less damage resulted than was expected. The season was about two weeks earlier than usual, and when the wet period came the weather had warmed up somewhat and the young were sufficiently developed to resist exposure. While an excessive rainfall is not desirable, nevertheless it is less deadly than great changes of temperature during a rainy season.

### FIRES.

The amount of land, both field and woodland, burned over by forest fires was greatly in excess of any year since 1911. All this had its effect on the bird population by destroying the breeding birds and young when fires occurred in the breeding season, by restricting the nesting sites, cover, and food supplies.

### POSTED LAND.

The tendency towards posting lands seems to have been arrested. Many forces are working calculated eventually to bring about a greater freedom of the public on the land, e.g. the educational work of the Division and the sportsmen's associations; the better understanding by the average hunter and fisherman of the value of these privileges, induced by the greater cost of the licenses, and the realization that continuance of the privilege depends on the goodwill of the land owners.



## MIGRATORY BIRDS.

*Song and Insectivorous Birds.*

Permits were issued to 79 individuals for the collection of birds, eggs and nests for scientific purposes under which 308 birds and 522 eggs were collected. To persons acting for the U. S. Biological Survey in determining facts concerning bird migration, 185 bird banding permits were issued. It is well-nigh impossible to make any general statement concerning a classification of bird life which includes so many varieties as that known as "song and insectivorous birds." Our particular duty to these species is the enforcement of the protective laws, to which special attention was given this year. (See Law Enforcement.)

The report of the Moose Hill Bird Sanctuary, where much of the effort centers around the species under discussion, appears under Reservations.

*Migratory Game Birds.*

In a State bordering on the ocean the attempt to report bird migrations is very difficult because, under favorable conditions, a large percentage passes out over the water. On May 12 occurred, on the north shore, one of the greatest flights of shore birds in many years, and again along the shores from Aug. 27 to 29 a remarkably heavy flight, especially numerous at points on Martha's Vineyard and Nantucket. The reports during the fall migration indicate that more birds than usual went south outside, and with pronounced losses by reason of adverse conditions when flying over the ocean.

*Plover.* — There was no spring flight of the black-breast plover on the north shore. South of Boston it was normal. There were fewer than usual at the opening of the shooting season on Aug. 16, and but few golden plover. The flight came in a body, mostly from Aug. 27 to 29. Upland plover presented no unusual features in the spring flight. Through the summer and fall more were reported than has been the case for a number of years. Killdeer plover are increasing, and more bred than in recent years. Piping plover are spreading on our coast.

*Snipe.* — The flight of the Jack or Wilson's snipe, owing to the high waters in the late spring, was more scattering than usual, yet in favorable localities heavier than in recent years. On the fall migration large numbers passed over Massachusetts. In many places the usual favorable conditions did not obtain, as, for example, in the flooded marshes along many of the rivers. On the other hand, in the wet marshes that were attractive the flight was heavier than usual and it came late, many birds being reported up to late October, and a number shot in early November.

The spring flight of the dowitcher or red-breasted snipe was of ordinary proportions. With the beginning of the shooting season Aug. 16 and continuing during the usual flight period they were reported in increasing numbers throughout the entire coast, but more noticeable from the central coast to the south.

As for woodcock, indications from all over the State showed no unusual features in the spring flight. There was the normal distribution in the breeding areas. In some localities the young birds were unusually numerous; in a few sections none were reported. It is always difficult to properly size up the crop of young birds, for opinions are apt to be based on their presence along travelled areas rather than from investigations deep in the covers where the tenacious foliage conceals them from casual observation. In the fall prior to the open season woodcock were numerous, indicating that uniformly over the State the breeding season was favorable. Testimony of the past few years is to the effect that they are substantially on the increase.

*Rails.* — The Sora rail appeared throughout its natural range in about usual numbers. It is not hunted to any great extent, and is slowly increasing. The high waters of the late summer gave it more than usual protection during the entire season.

*Sandpipers.* — The spring flight of sandpipers did not indicate an unusual number of birds, but in the spring and early fall migration larger numbers were observed than usual. Taking the several species as a whole the reports all along the shore indicated that larger numbers were present throughout the period as a whole.

For the past ten years very few of the knot or red-breasted sandpiper have been seen on Nantucket, but this year's appearance there was the largest in the last fifteen years.

Speaking of yellow legs, the spring migration of the summer yellow legs was of ordinary proportions, indicating a fairly well distributed and maintained movement. The fall flight was ordinary in numbers passing, as well as to time.

The spring migration of winter yellow legs revealed more birds than usual, the flight starting and continuing under normal conditions. The fall flight was one of the heaviest known in years and continued well into October.

*Hudsonian Curlew.* — There was the usual scattering of curlew along the shore during the spring movement. On the fall migration, while it was not as heavy as a year ago, enough birds appeared to show that the curlew, especially the Hudsonian, bids fair to slowly increase.

*Wild Fowl.* — There was nothing unusual to mark the general spring migration of wild fowl. The movement in the fall indicated, taking all classes into consideration except geese, that the wild fowl are steadily responding to the protection by Canada and the United States. The shooting seasons in both countries are reasonably conservative, as are the bag limits. So far we have done well, but there still remain the great needs of extensive breeding areas and permanent resting places along the lines of flight. When these are provided the people of the North American continent will have solved for all time the problem of maintaining and increasing wild fowl life.

*Black Duck.* — The black duck lived up to expectations in maintaining the increase of the past few years. The spring flight was normal as to time and throughout the entire range the birds bred in practically every favorable locality. Fewer were taken in the open season than last year. This is difficult to account for, one reason probably being that the high water on the marshes gave a greater feeding area than usual.

*Wood Duck.* — The spring migration of wood duck was without special feature; they bred well and large numbers of young were seen. Increased interest was displayed by individuals in breeding them. They enjoy complete protection in Massachusetts and have increased substantially, locally as well as throughout the country.

*Mallard Duck.* — Every spring a few mallards are observed. The extent of their breeding in the State is difficult to judge, since many of the semi-wild product of recent artificial propagation follow the migration of the wild birds, returning in the spring to breed. The fall generally brings a scattering of mallards, but they are not counted on to supply much of the bag.

*Red Head.* — The spring flight was not unusual in any respect, the movement being observed only off Nantucket and Martha's Vineyard. During the fall more were reported in sections generally visited by them, than has been the case for some years.

*Canvasback.* — The canvasback has always been a very uncertain factor in the sporting possibilities. The spring flight is of no moment, and the fall flight very uncertain. Usually the number of canvasbacks are more or less in proportion to the number of red heads. Several substantial flocks were reported, and more taken than usual.

*Bluebill.* — The spring movement of bluebills, normal in proportions, started and finished about per schedule. In a few localities it was slightly on the increase. The fall migration started early and was well sustained. The bluebill (we refer to the greater and lesser scaup collectively) appears to be slightly increasing in numbers, although one of the favorite ducks of the Atlantic coast.

*Scoter.* — The spring and fall migrations were of usual proportions, with the improvement shown last year as to numbers, maintained.

*Whistler.* — The whistlers (Golden Eye) arrived somewhat later than usual on



the southerly migration in the winter of 1921, and in normal numbers. Owing to its late arrival it is not heavily gunned in this State as in the old days when shooting whistlers from an ice hole after the waters had frozen up, afforded sport to a very rugged type of gunner. The spring migration was unnoteworthy, with the usual number of birds. Considering the complete protection accorded it in most North Atlantic waters after the first of February it is surprising that increase is not more rapid.

*Widgeon.* — The spring flight is negligible. The fall flight disclosed the usual number of birds, which were localized more or less, as in previous years, in several fresh-water ponds on the mainland and Martha's Vineyard. Some are taken annually on Nantucket.

*Sheldrake.* — The spring flight was normal with an increasing number of birds, while the fall flight was fairly heavy.

*Geese.* — The beginning of the period of this report is Dec. 1, — in the middle of the southern migration. On Nov. 24, 1921, just before the memorable ice storm, there was an immense flight of geese (as well as other water birds) along our coast. The geese came for days, and the flight was sustained throughout the balance of the open season (to Dec. 31). A southern movement was noted even later. Good numbers remained through the winter. The increase in the numbers of geese in migration has hitherto been most apparent on the fall flight. This year the northern movement in the spring was of a character to cause general comment. The flocks appeared early, and flew steadily and continuously, in immense numbers. It is the general opinion that the spring flight of 1922 was the greatest in a generation. The fall flight started rather early, and indications presaged a heavy flight; but there was a decided slackening and up to November 30 a very lean year is to be recorded. The fall was marked by mild weather, and reports indicate that large numbers of geese passed down over the ocean.

*Brant.* — The spring flight of brant off Nantucket began early and was very heavy. Thousands stopped all winter as there was little ice. The fall flight was likewise unusually heavy. Such reports as have been received from the rest of the State indicate larger numbers on the spring than the fall movement.

*Statistics of the Gunning Stands.* — Number of stands operated, 145; reports received, 123; geese shot, 2,960; ducks shot, 13,454; live goose decoys, 3,647; wooden goose decoys, 3,653; live duck decoys, 5,033; wooden duck decoys 3,328.

#### *Migratory Non-Game Birds, — Gulls and Terns.*

Caretakers were employed at the Chatham and the Monomoy colonies during the breeding season.

At Chatham weather conditions were favorable except for a period from mid-June to July when severe rainstorms and cold killed many young. The year's product which survived was about 2,500. The small amount of vermin which showed itself was trapped up.

At Monomoy the locality was found to be overrun with wild house cats and skunks. Persistent work through the season resulted in comparative freedom from vermin at its close. Considering how much the colony has been reduced by vermin in previous years, the season may be called good. The breeding birds numbered approximately 1,000. There were some losses from vermin and the storms of June raised havoc, but thereafter the season was successful and the production approximately doubled the number of breeding birds. During the following fall the keeper of the Monomoy Light continued the work of vermin extermination.

No survey was made of the other colonies, but reports of many hundreds of newly hatched terns dead on the islands off the coast point to a considerable loss from the storms of June and July.

#### *Destructive Agencies.*

*Oil.* — The effect of oil waste on water birds is discussed under "Pollution."

*Light Houses.* — Of the 57 lights, 49 reports were received. At 36 no birds were killed on migration; 13 report fatalities aggregating 139 birds.

*Federal Control of Migratory Birds.*

The Public Shooting Ground — Game Refuge Bill is still in Congress. While the general regulations for the taking of wild fowl on the North American continent are well worked out, the equally important requirements of protected breeding grounds and rest areas in migration remain practically untouched. Until these are provided for we have built without our foundation.

## UPLAND GAME.

*Pheasants.*

Pheasants wintered very well, as there were no deep snows and little sleet or crust. The breeding season presented no unusual features. The plan of shooting only cock birds has won public favor, and the regulations of last year were continued. The reports of pheasants shot in open season (required by law to be made by hunters) showed 1,728 killed, a substantial increase over the previous year. It is realized that these figures are incomplete and that many fail to report their kills, but it is reasonable to assume that they are as representative as the figures of other years. Massachusetts maintains the most liberal open season of any State in the Union on this propagated species. There are several considerations back of this policy, — the sportsmen have voluntarily agreed to doubling the license fee, and in fairness to them every reasonable opportunity should be given to hunt, consistent with the maintenance of the species. The pursuit of the pheasant helps to relieve the hunting of the native game birds, as has been so frequently pointed out. This is very important, for the reason that the stock of pheasants can always be replaced, which is not true of the native species.

*Ruffed Grouse.*

In spite of a scarcity of some kinds of the natural food of the grouse they came through the winter well, and spring found a substantial breeding stock in the covers. Regardless of the excessive wetness of the breeding season there was an unusually good production, and later in the season the report was common that more young grouse were seen than for several years. In one small section of the State there were some reports of damage to fruit trees by reason of spring budding by the grouse. Investigation showed it to be confined to a very limited area and the amount of actual damage problematical.

On the opening of the shooting season the country was very dry, presenting the usual fall difficulties in grouse hunting; the birds were more widely scattered than usual, but, generally speaking, there were more in the covers than noted at any time for several years. We seem to be in that portion of the cycle of grouse history wherein the supply is gradually approaching the maximum. If it runs true to form several years of fair abundance may be expected, then a gradual decrease to the point of scarcity. This seems to be a situation over which man has little control, and it is well to note that the variations cannot be charged to the hunters, because during the past few years, in the face of actually increased pursuit, the grouse are steadily gaining.

*Quail.*

In that section comprising Bristol, Plymouth, Barnstable and Dukes counties, which we have come to regard as the quail range, the quail wintered well, for the weather was mild with little snow. The long, wet, cold period in the breeding season proved very detrimental to the early broods, and all over the Cape district no young were seen in the early summer when they should have appeared; but late in the summer and fall they began to be seen, and in good numbers. Apparently the first broods were wiped out and the year's crop was a second hatching. In other parts of the State, where quail for years have done little more than maintain themselves in small numbers, there are reports of decided improvement, notably in southwestern Worcester and Eastern Hampshire counties, and western Norfolk.



The closed season which had prevailed for five years in Middlesex, Nantucket, Dukes, Essex and Hampden counties expired in 1922, and on our recommendation was renewed until the open season of 1925. The increase in most of these counties had been slight at the best. Only on Martha's Vineyard were definite results observable, illustrative of what may be done by restriction of shooting combined with stocking, for there, from great scarcity in 1915, the quail have been restored to such numbers as to bring up the question of an open season. It appeared to be the part of wisdom, however, to give them an additional period of protection in which to better establish themselves.

#### *Deer.*

The deer situation changes but little from year to year. A growing number of complaints of dogs chasing deer during the open season led to legislation providing that dogs should be kept out of the woods during deer week. Still-hunting is unquestionably the proper way to hunt deer in New England, and cannot be properly pursued if dogs are present in the covers. If sport in the proper sense of the word is to thrive, the devotees of one branch must be willing to conduct their sport with due regard to the reasonable rights of those who pursue the other branches. The deer season is of six days' duration, during which it is reasonable to ask all other hunters to give way to the deer hunters. Hitherto it was common for fox and rabbit hunters to permit their dogs at large during deer week. In the North Country a hunting dog would not be tolerated during the deer season, and would be shot on sight. It is remarkable and a favorable commentary on the forbearance of the deer hunters of Massachusetts that they have not long ago taken this matter into their own hands.

In the open season falling within the period of this report (Dec. 5-10, 1921), 1,132 deer were killed, 577 bucks and 555 does. Hunting conditions were somewhat unfavorable, for in Berkshire County the mountains were covered with ice; elsewhere the crust made noisy hunting; and the woods in all sections inland were littered with broken trees and fallen branches from the ice storm of a short time before, making travel very difficult.

The number of deer shot while damaging crops was 108; the disbursements by the Commonwealth (reimbursements to towns) for damages by wild deer was \$5,979.16.

#### *Moose.*

Moose are not numerous enough to present any serious problem. They are slightly on the increase, and apparently there is more favorable range for them than generally supposed. None were killed during the year, and no claims for damage presented.

#### *Squirrels.*

Opinion is very much divided as to what is happening to the squirrels, positive reports of decrease in many sections being offset by just as strong contrary evidence in other places. They undoubtedly congregate where food is plentiful, migrating when a change is forced by reason of lumbering operations or further destruction of chestnut and other food trees. In many parts of the State they are hunted very little; in others they are popular sporting animals, — especially with the younger generation of gunners.

#### *Hares and Rabbits.*

The supply of native rabbits is quite generally held to be about as usual, with a tendency towards increase. In fact, the bulk of testimony is that they are plentiful.

The northern hare, when liberated in the proper environment, makes very satisfactory increase, and several favorable localities have become well stocked through our efforts and those of associations, with stock imported from Maine. At first all parts of the State shared equally in these distributions, — partly in response to the insistent demands of the hunting public. But as the work progressed the futility of stocking certain sections became apparent, — primarily those of scanty

snows and where the ground is bare for the most of the winter, such as Cape Cod, Nantucket and Martha's Vineyard. As the hares turn white in winter, they are very conspicuous where there is no snow, and the readiness with which they fell prey to vermin proved that indeed "Death loves a shining mark." Hares are now put only into those sections which furnish the required conditions, — extensive growth of laurel, hemlock and cedar, or inaccessible swamps, and plenty of snow over a long period of the winter. There are probably but few locations really suitable to them east of Worcester County, excepting the swamps around Middleborough and the cedar swamp of Hamilton and Wenham. Hares and rabbits for propagation or liberation may now be imported at any time of the year. Previously they could be brought in only during the open season. (See also Fish and Game Distribution.)

#### *Fur-bearing Animals.*

The trapping season of the fall of 1921 and spring of 1922 can hardly be called more than an average one. Prices are lower, and while some trappers continue to operate, in many sections all the trapping is done by juveniles. In some localities the fur-bearers were cleaned out in the period of high prices and have not become re-established. This will undoubtedly be the case in Barnstable County under the present intensive trapping. In Berkshire County, where fur is sought more systematically and extensively than in the rest of the State, it was a good season.

There are many respects in which the trapping laws of this Commonwealth could be revised and brought more in line with existing legislation in other States. Without going into details it is sufficient to point out that the fur-bearing animals should be considered a State asset. The collective damage is more than offset by their economic value plus the annual income from pelts taken. It should be more fully realized that the muskrat, through over-trapping, is so greatly on the decline that fear may well be entertained for its survival in certain localities.

Foxes were reported in the northeastern section as running from normal numbers to scarce; in southern Massachusetts, fairly abundant, varying to plentiful. They are hunted and trapped to quite an extent. Central Massachusetts reports the two extremes of plenty in some localities and trapped out entirely in others. Many pages could be written on the pros and cons of protection to the fox. We realize that the greatest opposition to such action would come from the poultry growers. While admitting some damage is suffered, yet, taking it by and large, these annual losses are apt to be over-estimated. Massachusetts is fast becoming a fruit-growing State, and in the past few years the common field mice have done great damage to fruit trees by girdling. We are also familiar with the damage by the mole. When we consider the varied diet of the fox over the twelve months of the year there is much to say in favor of his economic value. Fairly kept, the ledger account is by no means one-sided. The damage to bird life has often been emphasized, yet today we are witnessing the phenomenon of the actual increase of our game, song and insectivorous birds despite the presence of the fox. It is significant that today 22 States protect the fox in one degree or another.

The pursuit of the fox is becoming a more wide-spread sport than has been the case in a generation. With some reasonable protection to the fox the sport would receive such an impetus that the annual kill would supply all the check required. If public sentiment has not come to the point of placing the fox in the class with other fur-bearers, at least the digging out of fox dens and capture of the young should be prohibited. None of these restrictions should be applied to the owner of the land, who should have the right at all times to protect his holdings against damage.

#### ENEMIES TO GAME.

##### *Cats.*

The problem of the semi-wild, abandoned house cat is unchanged. There will be little improvement in the situation until the status of such cats as unprotected vermin is fixed by legislation, and organized efforts made for their control. More



and more the sportsmen are charging themselves with the task of disposing of such as they find in the course of their hunting, but the problem is too great to be handled in this way. The headlights of automobiles on the country roads at night have been helpful in disclosing to the average lay person a situation well known to the sportsmen and bird lovers, — that the wild hunting house cat is the greatest single menace to the wild life of this State which exists. This fact cannot be too strongly emphasized or over-stated, and it is a singular commentary of the state of the public mind that this situation is not taken firmly in hand and met. The Commonwealth is spending thousands of dollars every year to make the outdoors increasingly attractive. Various agencies are taking the people more and more afield. Greater emphasis is being placed on the delights of the wild life. And yet we are indifferently maintaining, without the least effort at control, the most deadly agency of destruction to all these beautiful things.

#### *Starlings.*

Starlings are increasing enormously and alarmingly, and are becoming a nuisance. There is no check on them, for though not protected they are not game, and there is no incentive to kill them.

#### *Hawks, Owls and Other Vermin.*

Concerning hawks and owls there are no exceptional features to report as to their relation to game in the past year. Weasels are becoming noticeably numerous, and are a more potent factor in the destruction of game than is generally realized.

#### RESERVATIONS.

##### *Martha's Vineyard Reservation.*

The month of December, 1921, which opened the Division's year, was favorable for the comfort and the food supply of all bird life. Not until the last of the month were the ponds frozen completely over, and there was no snow on the ground.

On January first 43 heath hens were seen in the cornfield to the west of the reservation house, — a much smaller number than have been seen in recent years at that time of year. This was the largest flock seen at one time during the winter, although several small flocks were seen in other parts of the range.

The winter was mild as a whole, and natural food was as abundant as in the average year. But few days were severe enough to cause apprehension concerning the food supply for either heath hen or quail. The winter passed in patrol work, trapping vermin, hunting hawks, repairing roads and performing the ever-necessary farm work. On or very near the reservation 19 cats and 16 hawks (together with large numbers of rats) were killed.

Feed for heath hen and stock was grown as in the past. On Feb. 26 was heard the first booming of the heath hen. In the usual spring census an extensive survey of the range gave 117 individuals by actual count. Since the heath hen has been protected in the present manner it has experienced varying fortunes. In 1916 before the great fire that swept nearly all of its range and materially reduced their numbers, the heath hen were estimated at 2,000. Since then they have not increased to the extent that was to be expected with all the protection and feeding, and at the present time it is doubtful if there are more than 500 on the island. Only one fire occurred during the year, and this burned but a small portion of the area suitable to heath hen.

##### *Myles Standish State Forest.*

The past year at this reservation may be characterized as successful in regard to wild life. Pheasants have increased so that they are seen in all parts of the reservation; quail, hitherto scarce, are now quite numerous; grouse about held their own; black ducks are coming to the ponds in large numbers; wood ducks are more numerous; deer in good numbers.

The propagation of pheasants was resumed and 50 that were raised were kept as the nucleus of a brood stock. An important part of the work on a reservation of this character is the control of vermin, to which much time was devoted. The forest was patrolled both early and late, and three cases taken to court.

### *Moose Hill Bird Sanctuary.*

The year just closed has been an important one for the Sharon Reservation, in that a definite, permanent area has now been secured for the protection of wild life, by the purchase by the Massachusetts Audubon Society, in January, of one of the most important tracts of land within this area. It includes a large house, to which headquarters have been transferred.

The name "Moose Hill Bird Sanctuary" will henceforth refer strictly to the land owned by the Society, which at the present time consists of forty-five acres of diversified field, forest and meadowland near the summit of Moose Hill. With this sanctuary as a nucleus there is now a protected area of nearly 1,000 acres among the Sharon hills. Owners in the vicinity gladly permit their property to be posted against hunting and trapping.

Within the new sanctuary grounds is a meadow lot containing a never-failing spring and a little stream, with most excellent surroundings for the making of a sylvan pond which would be an attractive and well protected home for wild fowl and other marsh-loving birds. The wooded hills, brush-covered hills, thick swamps and open lots which make up the remainder of the tract form splendid cover for the wild life which is abundant all over the new area. Within this restricted area 103 species of birds have been observed during the past year.

The breeding season was unusually hard for the nesting birds, for severe and prolonged storms raged, following which many dead young and even adults were found. In late May two bad forest fires swept the hills, destroying much cover. Notwithstanding this there was an abundance of bird life. About 70 species breed within the grounds, — several of these, as the white-breasted nuthatch, hairy woodpecker and hermit thrush being locally rare in their nesting habits. Feeding of the wild birds was kept up continuously throughout the year. The detailed biological survey of the area has been continued. Coöperating with the United States Biological Survey 239 birds, representing 25 species, were banded.

Patrol work was maintained throughout the year; a general respect for the laws was observed and no arrests found necessary. Visitors come in constantly increasing numbers and over 4,000 registered during the year. Headquarters are being more and more developed into a compendium of information upon all subjects pertaining to wild life, as well as a supply house for bird materials and pamphlets regarding educational work along the lines of wild life conservation.

### *Reservations under Sections 69-75, Chap. 131, Gen. Laws.*

The Lynnfield-Peabody and the Mansfield-Foxborough reservations were renewed this year for additional periods of 3 and 5 years, respectively. The Taunton Reservation and the Bare Hill Reservation, Harvard, expired in October and no petitions for renewal were received.

Under the act above cited the Commonwealth received from Dr. John C. Phillips of Wenham the gift of about 200 acres of land in Boxford, surrounding Crooked Pond. The general plan is to develop it on the plan now in operation in the State forests where suitable parts are reserved as sanctuaries, others laid out as public camp sites, and still other portions open to hunting and fishing. The final technicalities for making this reservation and the promulgation of regulations for its use have not been completed.



## INLAND FISHERIES.

### GENERAL.

In the Commonwealth there are upwards of 4,000 miles of unnavigable streams, which for a number of years we have been systematically stocking with brook trout, together with some brown trout and a few rainbows. All of these fish may be artificially propagated, and we are equipped to handle them. In other words, the continuance of stream fishing is very largely a question of dollars and cents, being a case more or less analogous to that of the pheasants in the covers. The weak spot in the plan is the fact that the riparian owners have, practically speaking, the control of this water system, with the latent possibility of undoing our efforts by excluding the public under a concerted movement. While this is not likely to happen in the immediate future, the possibility remains.

We have upwards of 850 great ponds which under the Constitution are open to the public to free boating, fowling and fishing forever. These ponds are primarily adapted for such fish as the pickerel, perch, blue gills, horned pout, catfish, large and small mouth black bass. For all of these, except the small mouth bass, we must rely on the natural production by the stock in the ponds, a comparatively slow process. The shores of the ponds are becoming more rapidly built up with cottages and fishing is more intensive. Thus the problems of the future will be those of maintaining the fish life in the great ponds, rather than in the streams. Without enumerating the methods by which the objective will be attained it is plain that for a while, at least, increasing attention needs to be given to ways and means of increasing the fish life in the ponds, while keeping the annual plantings of trout equal to or somewhat above the present output.

### BROOK TROUT.

Speaking for the State as a whole the trout fishing season was poor, opening with snow and rain and cold, windy weather. At that time a few good strings were taken, but the excessive rainfall following flooded the streams and made them inaccessible to fishermen for the greater part of the season. This and the abundance of feed prevented large catches. All this worked for the ultimate benefit of the sport, however, in giving an additional season for growth and more breeders.

### BROWN TROUT.

Brown trout fishing in the Westfield River (selected for development as a brown trout stream) was better than at any time in the last six or seven years. Over thirty brown trout from 14 to 17 inches long were taken, and the river was unusually full of 8 to 10-inch fish. From Broad Brook, Easthampton, an 8-pound brown trout was taken 28 inches long. All of which makes our effort to establish this fish seem well worth while.

### CHINOOK SALMON.

The propagation of Chinook salmon is suspended pending observation over a considerable period of the results of past work. Up to May 7 there are recorded about 70 Chinook salmon taken in Long Pond, Plymouth. The majority of them weighed  $2\frac{1}{2}$  and 3 lbs. with several four and one five-pound salmon. In contrast to last year, there were few small ones.

Cliff Pond, Brewster, yields a few each year. Report reached us of the capture of eight from 2 to 3 lbs; 11 from 3 to 4 lbs.; 2 of 4 lbs.; one of 5 lb. 2 oz.

Despite the usual efforts through newspaper publicity and inquiries among the trap fishermen we could learn of no Chinook salmon being taken in the Merrimack River as a result of the plants made from 1913 to 1920.

## PIKE PERCH.

Pike perch eggs were collected in Vermont, the expense shared by Massachusetts, Vermont and the United States government. The flooded conditions of the river, high winds and heavy seas made the taking of spawn an arduous task. The pike perch is such a desirable fish that we have wished to make it available for our fishing constituency. But it has taken hold in only a few waters, and in view of the small returns and large expense the wisdom of continuing is open to question. Trials have been made of a number of species not native to our waters, with no permanent benefit, and it remains to be seen if the pike perch will prove to be another instance. We are recommending seasonal restrictions in addition to the bag limit now in effect.

## PICKEREL.

While reports of good pickerel fishing are current in certain places, these refer to specific bodies of water rather than to the fishing waters of the State in general. The localities are many where it is distinctly declining. We can only repeat our statement, that there should be some restriction on winter fishing, the legal length should be retained at twelve inches, and the sale prohibited. The whole pickerel situation is very fully discussed in the 1921 report, since which time nothing has transpired to change the conclusions there set forth.

## BASS.

From time to time reports are received of black bass being taken through the ice, despite the current theory that they become dormant in the late fall and do not take the bait after the ice has been formed for a period. Definite information was solicited through wardens and bass fishermen, and evidence was abundant that bass are very commonly taken fishing through the ice. The lengthening of the closed season on bass to make it Dec. 1 to June 30 instead of Feb. 1 to June 20 was a step in the right direction, but the prohibition of sale is still to be secured before this popular fish has the protection it requires and deserves. During the year a good number of ponds yielded very satisfactory catches, both as to size and number. There was very good fishing in the Oxbow at Mount Tom, and the bait casters along the Connecticut and Deerfield rivers were enthusiastic over excellent catches.

## WHITE PERCH.

The legislature gave a yearly period of protection to the white perch in State-stocked waters from March 1 to May 31. There is little new to be said concerning this species. Only a few ponds (speaking in State-wide terms) afford really good white perch fishing, though the situation is slowly improving. Our best efforts serve to stock but a few ponds each year, and from time to time, after a sufficient period has elapsed, they begin to yield. Salvage work (omitted last year for lack of funds) was resumed. (See Fish and Game Distribution.)

## SMELT.

In regard to fresh water smelt, the belief has prevailed among the local fishermen that the abundance of smelt in Onota Lake, Pittsfield, has ruined the fishing by providing too abundant feed, and for a couple of seasons we have tried to reduce the numbers by collecting them on the spawning beds and distributing them to residents. This year we screened the entrances to the brooks to compel spawning along the lake shores where the eggs would be consumed by other fish. Results will not be evident before another breeding season. There are only a few ponds where smelt are established in numbers, and in practically all such cases local sentiment is similar to that at Pittsfield; but it has been our feeling that the additional food supply would be reflected in a better production of larger food fish.



The salt water smelt fishing season from June 1, 1921, to March 15, 1922, was one of the most unproductive ever known to local fishermen. This was contrary to all expectations, for the spring run in 1921 at the Weir River had been large and promised a good catch the following year. As a whole the spring run in 1922 was much greater than the previous one. The smelt appeared in the falls on March 14 and the first run began the 23d, but was broken by a heavy snowstorm on the 30th just as it began to be heavy. The second run from April 10 to May 1 surpassed all records, with the day run nearly equalling the night run, and smelt were found in practically all the streams. The deposit of spawn by the first run was very good, and as it was not over-abundant, the eggs had a better chance to hatch. The water was not excessively high, so there was no great waste of spawn on ground above normal water mark, and probably all had hatched before the second run began. The deposit from the second run was so heavy, in many places 3 or 4 inches deep, that doubtless nearly all went to waste.

Studies were continued on the ground on various methods of stripping and hardening the spawn and determining the suitability of the water for hatching purposes. All of this preliminary to the development of a small hatching plant when control through lease of the necessary land and water shall have been acquired, for which negotiations are under way.

#### HORNED POUT AND CATFISH.

The horned pout in our ponds are standing up well under the taxing conditions under which they are fished, — there being no size limit and no protection in the breeding season. There are still a good many localities where fishing proved excellent during the year and good catches made; but the signs of deterioration in this fishery, speaking in State-wide terms, are evident in the many reports of fishing below normal, or small-sized fish. Advantage is taken of every opportunity to secure stock from any source that presents itself, to build up the stocks in the State.

In continuation of the work of establishing food species in such rivers as the Merrimack and Connecticut, catfish were obtained from Pennsylvania and Ohio, — for details of which see "Fish and Game Distribution." The effort to acclimatize these catfish is an experiment, pure and simple, concerning which we make no promises. If successful, it will be a great satisfaction; if a failure, it will at least indicate that we are studying the problems. The Pennsylvania shipment consisted of the white or white-bellied catfish, locally called the "Delaware" or "Schuylkill" catfish, as on the Potomac it is the "Potomac catfish." It grows to a much larger size than our bullhead or horned pout and has white flesh, of finer texture and flavor. The fish from Ohio were the channel and silver catfish, the former *Ictalurus punctatus* (Rafinesque); the latter so nearly identical with the channel catfish (varying apparently only in the markings) as to be almost indistinguishable.

#### BLUE GILL SUNFISH.

Propagation of the blue gill sunfish was carried on with the stock received from Pennsylvania in 1920. The fish have lived two years in the Stockwell Ponds at Sutton with a mixed stock of native fish, increasing substantially in numbers. A local source of supply was found in King's Pond at Plymouth (where the blue gill had become established through the efforts of Dr. F. A. Lucas). An examination of the lake showed nests in good numbers, on all shores having suitable depth, on all kinds of bottom, ranging from fine sand, where the fibrous roots of the bottom vegetation made a suitable lining, to coarse gravel worked out until only cobbles remained. Very many were made in the sunken drift, especially where the needles of the pitch pine had collected in beds. Seining of adults in July was hindered by the presence of vegetation and it was difficult to keep the fish alive when seined from the deeper and colder parts and brought to the surface.

It would seem that future salvage work can most profitably be done with the adults, which are hardy and stand transportation and can be taken as they hover

about the spawning beds. The young are very sensitive to handling or changes of water or temperature, and do not survive long after capture, and seining would be difficult since they live under cover of the vegetation. (See Fish and Game Distribution and Stockwell Ponds.)

#### WINTER FISHING.

The ice fishing season of 1921-1922 presented no remarkable features. In general it was an average season, running to excellent in spots and poor in others. Many ponds are yielding small-sized fish. The need of restriction on ice fishing has been thoroughly set forth in other reports.

#### PONDS.

##### *Ponds stocked and closed.*

The following ponds were stocked under Section 28, Chapter 130, General Laws and closed to winter fishing by regulations which in all cases expire Nov. 1, 1925: Quabbin Lake, Greenwich; Spy Pond, Arlington; Forge Pond, Westford, Littleton and Groton; Greenwich Lake, Greenwich; Long Pond, Littleton. The regulations close the ponds to all fishing except between May 30 and Oct. 31, inclusive, of each year, and the tributary streams are closed except between April 15 and July 31, inclusive. Fishing is allowed only with a hand line and single hook, or with a single hook and line attached to a rod or pole held in the hand.

##### *Privately-owned Ponds stocked.*

The following privately-owned ponds were stocked with food fish on stipulation of the riparian proprietors that they would permit public fishing therein for a specified term of years: Eddy Pond; Auburn, owned by American Steel and Wire Co. of Worcester, fishing permitted to Oct. 21, 1927; New Pond, Norwood, Westwood and Walpole, owned by Winslow Bros. & Smith Co. of Norwood, fishing permitted to May 8, 1927; Sargent's Pond, Leicester, owned by Leicester Woolen Co. and Worcester Consolidated Street Railway Co., fishing permitted to May 24, 1923.

##### *Spawning Areas closed.*

Under Sections 25-27, Chapter 130, General Laws, a portion of Lake Quinsigamond was closed entirely to fishing after Dec. 20, 1921. It is known that the spawning fish congregate on certain areas, and that, these locations being known to fishermen and the fish being particularly voracious when developing spawn, great inroads in the brood stock in the pond result. By permanently closing the breeding areas in Lake Quinsigamond an increased annual supply of fish may be expected, benefiting all portions of the lake. The closed areas are:

1. That portion which lies between Stringer Dam, the bridge over South Brook on South Quinsigamond Avenue in Shrewsbury and the bridge at Sunderland Road, covering an area of about 131 acres.

2. That portion which lies between the Lincoln Street bridge, the mouth of Poor Farm Brook, and the Stone Bridge on Holden Street, at the upper end of the lake, covering an area of about 31½ acres.

#### SCREENS.

In attempting to establish stocks of fish in ponds it is essential to prevent their escape down stream; but, while the Commissioner of Conservation has authority to instal screens in ponds, no appropriation is provided. In a number of instances fish and game associations have installed screens and paid the costs. This year, through the North Worcester County Fish and Game Club of Gardner, a 10x3 ft. screen was placed in Daniel's Pond, Gardner, and a 2½ x 8 ft. one at Queen Lake, Phillipston. Out of our appropriation for fish and game propagation we reimbursed the Westfield Camping Club for the screen installed by them at Big Pond, Otis, in 1918.



## FISHWAYS.

For a series of years this Division has been engaged in restoring such streams as were capable of maintaining a good alewife fishery, by securing the installation of suitable fishways at obstructing dams, thus opening the spawning grounds. The program followed in 1922 was to check results in the existing fishways, and to arrange for the construction of others where needed.

*Saugus River.*

Plans and specifications were made for the replacement of the destroyed fishway at the old Wallace Nutting Company dam on the Saugus River, and for the reconstruction of the wooden fishway at the dam of the United States Worsted Company at Prankers Pond.

*Taunton, Town, Satucket and Nemasket Rivers.*

The fishways on these rivers, except at the Easton Investment Company's dam, were in operation during the alewife season. The old Nemasket River fishways operated as usual, but still require considerable attention as noted in last year's report, before they become efficient.

*East Taunton Fishway.* — The fishway at East Taunton operated in the usual effective manner. The number of alewives that passed through was less than normal, corresponding to the remarkably poor fishing season in the Taunton River. It will be particularly interesting to note whether there is any increase in the alewives passing through this fishway in 1924 and 1925 as a result of stocking the headwaters of the Taunton River with spawning alewives in 1921 and 1922.

*Jenkins Leatherboard Company.* — The fishway of the Jenkins Leatherboard Company at Bridgewater was open during the early part of the season but was not functioning on May 20, when the matter was brought to the attention of the company. No alewives were observed at the fishway, though yellow perch and shiners were found.

*Carver Cotton Gin Company.* — The fishway of the Carver Cotton Gin Company of East Bridgewater was operating during the year but no alewives were noted. Tests were made regarding the flow of water and functioning of the fishway. The problem here is the regulation of the water flow, since during the night the water level rises at the dam and gradually falls during the day, thus producing a marked variation in the flow of water through the fishway. The installation of a simple side gate such as is now in successful use at the East Taunton fishway will probably prove satisfactory.

*The Stanley Works.* — The fishway at the Stanley Works was in operation during the season, but no alewives were observed since they must pass through the fishway of the Jenkins Leatherboard Company before they reach the Carver Cotton Gin Company or the Stanley Works.

*Easton Investment Co.* — This fishway is located at the old Ames dam on the Town River at West Bridgewater. Since it was not completed until fall it did not function during the spring run, but a passageway was maintained through the dam to permit the alewives to run up stream to Nippenicket Pond.

*Ipswich River.*

*Ipswich Mills.* — The Ipswich Mills fishway functioned during the alewife season, in spite of the high drop between the lowest compartment and low water level (due to the high water in the spring). No alewives were noticed at the fishway and therefore no observations as to its efficiency could be made. Owing to the marked difference between low water level below the dam and the entrance to the fishway it was found necessary to add more compartments and carry the fishway farther down stream. The owners agreed to make the necessary changes, and plans and specifications were prepared.

*Norwood Mills.* — Plans and specifications were submitted early in the year, but no action towards construction was taken until Nov. 25, when the representatives of Mr. Barrett met our engineer in conference.

*Willowdale Dam.* — Plans and specifications for a fishway were submitted to Mr. C. E. Rice of Ipswich, with a request that it be completed before the next run of alewives.

#### *Merrimack River.*

*Lawrence Fishway.* — The fishway at the dam of the Essex Company, Lawrence, was kept open from April 1 to June 30 to obtain, as far as possible, records of the fish that passed through. Owing to the high water and the swift flow through the fishway it was in working condition for only part of this period. A better method needs to be worked out for regulating the water flow through the fishway. During the times when the correct amount of water was flowing, the results with the run of fish were exceptionally good. From April 28 to May 31, shiners, carp and alewives passed through, with a run of hundreds of alewives from May 26 to 31. From June 1 to 18 it was recorded that 1,184 alewives, 9 carp, 353 shiners and dace, and 56 miscellaneous species passed through. A heavy flow of water beginning June 19 prevented fish from working up the fishway the rest of the month. The passage of all the common species of fish proves the success of the fishway, and the run of alewives, many times that of the previous year, indicate the possibility of once more developing an alewife fishery in the Merrimack River.

*Lowell Fishway.* — The new fishway installed in 1921 at the Pawtucket dam at Lowell by the Proprietors of Locks and Canals on Merrimack River was in operation for the first time this spring from Apr. 1 to June 30. Records were taken twice daily of the fish which were passing through. There were recorded in May 530 alewives; 2 carp; 1,802 shiners and dace; and suckers daily of which no record was kept. From June 1 to 15 there were 227 alewives, 2 carp, 918 shiners and dace, suckers daily, and a few eels and pickerel. No fish were observed after June 13, and from the 21st to the end of the month the water in the fishway was very high. Alewives appeared on May 26 in large numbers and ran until June 6. These had passed through the Lawrence fishway beginning May 17, an interval not exceeding nine days marking their progress up the river.

#### *Paskamansett River.*

A fishway was installed by Benjamin Cummings, Esq., in the fall at his dam in South Dartmouth.

#### *Barker's River.*

A fishway was installed by F. L. Snow at Pembroke. It connects a five-foot canal leading from the pond to the cranberry bogs, with the main stream at a considerable lower level, thus eliminating the necessity of a fishway at the dam. The fishway consists of a gradually sloping ditch 3 to 3½ ft. wide, about 500 ft. long, with at least a ten-foot drop. Every fifteen feet large loose stone baffles check the flow of water. The upper end has a sluiceway faced with cement in which the flow of water is regulated by a plank. To all appearance this type should prove a most practical fishway for the alewives.

#### *Parker River.*

Surveys were made and plans and specifications prepared for fishways at the dams of the Byfield Woolen Mills and the lowest dam of Mr. Benjamin Pearson.

#### POLLUTION.

The jurisdiction of the Division extends only to those cases of pollution which involve injury to and loss of fish life, irrespective of whether the pollution affects the public health. The problem is to prevent good fishing streams from receiving additional pollution, and to eliminate it gradually from waters where it is of ma-



terial damage to the fisheries. The past year's work has comprised a study of the effect of certain trade wastes upon fish, observations as to the effect of oil wastes upon water fowl, the survey of one river system as to pollution and the investigation of certain complaints of pollution.

### *Effect of Trade Wastes on Fish.*

Our studies have been concerned with paper mill and wool scouring wastes, and with various acids, alkalies and salts which are the constituents of trade wastes. Fish will live in a concentrated suspension of fresh paper pulp but are killed in the effluent from settling basins containing decomposing pulp. Sulphite wastes from paper mills at a dilution of 1:500 kill trout in six hours. Wool scouring wastes kill in the same dilution in four to six hours. The mineral acids kill trout in dilutions ranging from 80,000 to 640,000. Certain salts, i.e. copper sulphate, are decidedly more toxic than the inorganic acids. Fish differ in susceptibility and a chemical dilution which kills one species may affect another but slightly. This variation in resistance is found not only in divergent species, but also in the same family, as, for example, the salmonides. We find the respiratory action of the gill covers in fish to be an excellent indicator for recording the effect of certain forms of chemical pollution.

### *Effects of Oil Wastes.*

Aside from the destruction of water fowl and the public nuisance produced on bathing and recreation beaches, oil wastes are detrimental to fish and mollusks by destroying the young in the floating larval stage, preventing their set, and rendering the adult forms at times unsuitable for food. As to the effect of this oil pollution upon fish life there is lack of specific evidence. Fish are injured by chemical waste both by its direct action, and indirectly through the changes brought about in their environment, affecting spawning grounds, food and migratory habits. Our experiments indicate that a mixture of 1:1000 of crude petroleum does not immediately affect brook trout, which indicates that the oil wastes do not directly destroy fish. In our opinion the greatest damage to the fisheries is the effect upon the migratory habits of the anadromous and those species frequenting the inshore waters. A distasteful environment, such as would result from the oil wastes, will cause these fish to seek other waters, either by its direct action, or because the smaller fish, their food supply, have been driven away. Exact evidence upon this point is difficult and almost impossible to obtain, owing to numerous complicating factors.

Pathological examinations were made on murre, auklets, grebes and ducks which were found covered with oil. In spite of the fact that certain ones were so completely covered as to make examination impossible, and in others postmortem changes rendered examination difficult, enough information was obtained to warrant certain conclusions as to the action of the oil wastes. At autopsy practically all the birds showed a similar condition and a composite description of the findings may suffice for all specimens. Externally the birds are covered to a greater or less extent with a black sticky, tarry oil, apparently a closely related product to crude petroleum. The material is encrusted upon legs, feet and wings, and the feathers on the under surface of the body are usually completely covered and matted together with the oil, while patches of the same material are present on the neck and back. As a rule the head and beak are also covered through the attempts of the bird to preen itself. The oil not only causes an adhesion of the feathers, but penetrates to the skin at times, causing a slight irritation. It is inevitable that a bird thus covered will perish, particularly in severe weather when conditions tax the endurance even of birds in good physical condition. Death is brought about by (1) inability to navigate normally; (2) inability to obtain food; and (3) inability to maintain a normal body temperature. In most of the birds examined, the stomachs were empty and in a few instances there was evidence of beginning starvation. The internal organs were unaffected by disease and showed only postmortem changes. No evidence of pneumonia was found in any specimen.

*Water Pollution Survey.*

A survey of the Aberjona River in regard to the various sources of trade waste pollution was completed, in co-operation with the town of Winchester, as a result of which the town has formulated a program for the elimination of trade waste pollution in this river. Winchester is interested in its purification from the standpoint of the public health and recreation, and this Division in the relation of pollution to fish life.

*Investigation of Complaints.*

Further investigation was made of the reported pollution in the Middle Branch of the Westfield River, where it was found the amount of pollution was too small to affect fish life. Investigation was made of the reported pollution of Eel River, Plymouth, by the rubber reclaiming factory of the Boston Woven Hose and Rubber Company at Chiltonville. The wash water from the settling basin is discharged into the river, without any neutralization. Chemical analysis was made by the Department of Public Health of material from the settling basin, and of water from the river at various points. The pollution was found to consist almost wholly of acid waste, which because of its relatively small amount, was not sufficient to kill fish. However, changes in the normal reaction of the water may have considerable effect in keeping alewives and white perch from entering the stream. Since Great South Pond, the original spawning ground for Eel River alewives, has been taken as a water supply, Russells Mill Pond is the only suitable breeding ground. If the alewives could be induced to use the pond it is possible to restore an alewife fishery in Eel River. Thus the effect of even a small amount of acid entering the river would prove detrimental. It was pointed out to the Company that the difficulty could be readily remedied by supplementing the settling treatment by passing the effluent through lime filters.

On the assertion of the New York City Board of Health that clams from Barnstable Harbor were unfit for food, clams from the locality were examined by this Division, of which one lot gave a lactose fermenting bacillus resembling *B. coli*. The waters of Barnstable Harbor are singularly free from pollution, and at the request of the boards of Health for Cape Cod the Massachusetts Department of Public Health made an investigation, as a result of which no evidence was found of any source of pollution near the flats, and analyses of the clams and samples of water showed no bacteria characteristic of sewage. The report of the Massachusetts Department of Public Health was accepted by the Bureau of Food and Drugs of the Department of Health of New York City, and the sale of Barnstable clams was permitted.

In addition to those previously mentioned, routine complaints of pollution have been investigated by the district wardens.

**PROPAGATION OF FISH AND GAME.**

The propagation work includes not only the now well-known hatchery work, but the less familiar but important and growing field work, or acquisition of stock in other ways than by artificial propagation. It includes the collection of fish from over-stocked ponds; from water supplies that are closed to fishing, — a field just opening up; exchange with other commissions; purchase from commercial dealers or other sources. Another plan promising substantial yet inexpensive production is the holding of brood stock of such species as horned pout, pickerel and blue gill, in suitable ponds. After the initial work of cleaning them, installing dams for control of the water, and introducing brood stock, the only cost will be for the collection and distribution of the natural increase. Two units have already been acquired, more fully described under "Field Propagation."

The history of our propagation work represents a gradual development and much experiment. Present efforts are to continue those lines which have stood



the test of time and proved their worth, not aiming at further extensive expansion, but rather a concentration on the production, with the present facilities, of larger amounts of stock at a lower cost per bird or fish.

#### FISH HATCHERIES AND GAME FARMS.

##### *Palmer Fish Hatchery.*

No construction work was done to increase the output of bass, but a small amount for the newer brook trout work was necessary.

*Pike Perch.* — The 7,350,000 eggs collected in Vermont were hatched, producing 7,175,000 fry.

*Small-mouth Black Bass.* — The propagation of small-mouth bass was carried on in the usual way, and the hatching season very successful. But owing to weather conditions there was not the quantity of insect life in the ponds that was present last year; hence there were fewer fingerlings for distribution than had been expected. The output was 149,000 fry, 16,025 fingerlings, and 16 adults to fairs.

*Large-mouth Black Bass.* — From a small natural pond on the grounds there were seined and distributed 10,725 fingerlings and 60 yearlings.

*Pickarel.* — There were collected from one of the hatchery ponds and distributed 243 pickerel fingerlings.

*Brook Trout.* — The brook trout eggs handled consisted of 200,000 from the Sandwich Hatchery and 200,000 from a commercial dealer, and hatched with about a 13% loss. The young fish grew very rapidly after being placed in the rearing pools, so that by June 1 it was necessary to thin out some pools by shipments of 25,000 to Amherst, 25,000 to Montague and 39,000 to Sutton for rearing. There were distributed to public waters 117,875 fingerlings (1½ to 6 inches) and 15 adults, with 40 adults sent to exhibitions.

*Brown Trout.* — 100,000 brown trout eggs purchased from a dealer arrived in good condition and hatched with a very small loss. The fry were hardy and started to feed while in the hatching troughs, but after being placed in the pools refused to take food and most of them were lost. This is the first season at this station in the hatching of brown trout. 3,500 were reared for brood stock and 1,330 fingerlings and 18 yearlings distributed. There were 747 yearlings received from the Sutton hatchery which were held for brood stock.

*Horned Pout.* — Insufficient pond room prevented horned pout work. A few adult pout placed experimentally in the shiner pond produced 6,240 fingerlings which were distributed, together with 25 adults. Palmer was the receiving and distributing station for the pout fingerlings purchased and those from Vermont. (See "Fish and Game Distribution.")

*Blue Gill.* — As an experiment three two-year old blue gills were held to observe growth rates. Confined in a small pond they average one-half pound at three years. This season they bred, producing several thousand young, held for future disposition.

##### *Sandwich Fish Hatcheries.*

Rearing facilities were extended by a moderate amount of remodeling of old and construction of new ponds and pools, and screening against depredations of predatory birds.

During the fall of 1921 there were collected for the year's work, 1,566,000 eggs. Of these 200,000 were shipped (eyed) to Palmer Hatchery, 100,000 (eyed) to the Sutton Hatchery, and 250,000 planted in public waters. They were replaced by 300,000 purchased from commercial dealers.

There were some losses in the spring among the late-hatched fry from fungus, but the trouble was overcome by means of muck baths. There was a reappearance of the fish disease (Furunculosis) in the old wooden pools at East Sandwich (in which perfect sterilization had been difficult in the previous outbreaks). Prompt isolation and sterilization of the infected pools, and avoidance of crowding the stock, kept the disease in control with no material loss.

The year's product was assigned as follows:

Amherst Rearing Station (Advanced fry)	470,000
Montague Rearing Station (Advanced fry)	30,000
Worcester Fish and Game Association (No. 1 fingerlings)	60,000
Canton Fish and Game Association (No. 1 fingerlings)	25,000
Public waters (No. 3 fingerlings)	290,050
Retained for brood stock (No. 5 fingerlings)	12,000

A large percentage of the fish distributed in public waters ran from 4 to 5 inches, the largest ever distributed from these hatcheries.

In the course of the year 3,180 adults from the brood stock were distributed.

### *Sutton Hatchery.*

The work program for the year was largely connected with the development of the Stockwell Ponds. At the hatchery proper the old hatchery building was demolished and a pond constructed on its site, and another pond partly excavated in the low area on the east side of the grounds.

*Brook Trout.* — The egg supply shipped in was for egg-planting, for hatching at Sutton, and for about one-half of the Montague supply, to be re-shipped for late hatching. It comprised 100,000 from Sandwich Hatcheries, 1,050,000 purchased and 50,000 collected at Sutton. With the exception of a portion of the Montague supply the eggs were of low grade and produced only devitalized fry that yielded not over 20% of the normal fingerling output, and the number available at other stations for transfer to make up the deficiency (39,000 received from Palmer) could bring the Sutton Hatchery output up to 30% only. There were 110,000 eyed eggs planted, and 77,900 fingerlings distributed to public waters.

*Brown Trout.* — The brown trout work at Sutton was closed up, and the stock disposed of by distribution of 620 yearlings and transfer of 747 yearlings to the Palmer Hatchery where brown trout work will be concentrated in future.

*Horned Pout.* — Experimental work was carried on in the rearing of horned pout fry caught when schooling after leaving the nests, taken in course of salvage work at North Watuppa Lake. They readily adapted themselves to domestication and grew fast on the chopped liver fed to them. They were transferred as fingerlings to Stockwell Ponds for further growth. This opens up interesting possibilities in connection with a pond system where the breeding might be in excess of the capacity for growth, for this experiment has demonstrated that the surplus could be removed and reared in nursery ponds.

*Stockwell Ponds.* — Work at the Stockwell Ponds, though treated under "Field Propagation," is nevertheless done by the Sutton Hatchery crew and may properly be credited as a portion of their accomplishments.

### *Montague Rearing Station.*

The development and construction work was started as soon as the 1921 stock was out, and continued through the winter of 1921-1922 and well into the rearing season. Much control work was built to handle the water flow, permanent construction substituted for make-shift work necessarily done in the beginning, a large amount of additional rearing capacity provided, and much grading and clearing done. Near the close of the year the hatchery building was enlarged and its capacity doubled, and a building constructed to provide ice house, refrigerator, meat room, work shop and can storage. Telephone line was built to the camp.

From the yearling stock of brook trout held experimentally to determine egg quality 35,000 eggs were collected and the product carried through all stages to good-sized fingerlings with no difficulty. To this stock of eggs were added 780,000 shipped in (330,000 from Sutton and 450,000 from dealers), and later 150,000 fry (30,000 from Sandwich and 120,000 from Sutton). This stock proving insufficient owing to a considerable proportion of poor eggs and fry, 25,000 small fingerlings were received from Palmer to partly make up the deficiency. The unfavorable



results from some of the stock was due both to its poor quality and the necessity of using it last, when only the most difficult pools remained to be stocked. This condition has been partly remedied by increasing the capacity to carry early fry until the proper time to thin it out for stocking the late pools. There were distributed to public waters 117,000 eggs planted in brooks; 625 adults; and 372,450 fingerlings, the balance of about 10,000 reserved for further rearing.

#### *Amherst Rearing Station.*

The extensive pond construction program for developing the rearing capacity started last year, was continued, and a program started for minimizing the danger from surface water floods. Telephone connection was established with the South Deerfield exchange.

The station was put in condition to receive stock by the middle of March, and 470,000 brook trout fry were received from the Sandwich Hatcheries. As the product of this did not fully stock the station the deficiency was partly made up by the receipt in July of 25,000 fingerlings from Palmer. The fry received varied very widely in quality, and ranged from excellent, yielding 75% fingerlings, to very poor, suffering a loss of 75% immediately after arrival. The poor fry were in such proportion that, although the number received was much in excess of the capacity of the station, the losses made a deficiency through the whole rearing season. The output, however, was increased over last year through the added capacity secured by recent construction work. Distributions consisted of 257,500 fingerlings.

#### *Marshfield Bird Farm.*

A complete new brood system was installed in the small brooder house for the better handling of the stock, and various re-arrangements made for greater efficiency and convenience in working. The fifty acres of leased land on which the work has been carried on, was purchased.

Before the breeding season 162 adults were distributed. Eggs to the number of 16,215 were collected from a brood stock of 455 pheasants. There were 2,728 distributed, and 13,200 set in incubators. Of these 8,253 hatched, from which 3,528 were reared to distribution age and liberated. There were 216 set aside for brood stock and later disposition. The method of distributing by truck-loads instead of by many small express shipments (see "Fish and Game Distribution") relieved the station of much labor.

#### *Sandwich Bird Farm.*

After a careful consideration of the relative values of the experimental work hitherto conducted at this station and the production of pheasants in quantities, it was decided to make pheasant breeding by the incubator-brooder method the main object, and the necessary houses, pens and yards constructed in 1921 and 1922.

*Pheasants.* — The result of the year's work was more in the line of experience gained than in actual production. While the hatching by incubator was excellent, lack of knowledge of feeding and care of the incubator-hatched birds during the first few weeks of their life resulted in extensive losses. By the time this knowledge was acquired the laying season and opportunity to put the knowledge into practice, was past. From the brood stock of 177 pheasants 5,943 eggs were collected and 200 were purchased. They were set in incubators and some under hens. 4,300 were hatched, 430 raised to distribution age, of which 202 were distributed, 30 late-hatched ones held over, and the remainder added to the brood stock.

*Wood Ducks.* — The work was continued, but with a reduced stock. Wood ducks are substantially increasing throughout a large portion of the country and to some extent in Massachusetts, though the time will be long before opening of the season here will be warranted. A great interest is shown in the wood duck by bird lovers, and for applicants who are willing to make a special effort to locate a shipment on a favorable area and give it special protection, a limited number will be bred at

Sandwich where a small portion of the farm is specially well adapted to the work. The stock numbered 37 at the beginning of the breeding season. 190 eggs were collected of which 12 were distributed and 178 set under bantams. There were 137 hatched and 122 were raised to maturity, to which were added 10 young received from the Carver Reservation. There were distributed 110, and the remainder added to the brood stock.

*Quail.* — Only a few pairs of quail were kept to experiment with, but weasels reduced them to 3½ pairs. There were 39 birds raised and held for next year's work. We do not admit defeat in quail rearing, but have considered it advisable to reduce the work to experimental proportions and devote most of the effort to pheasant production. In quail work our aim has been, not merely to produce birds for liberation, but to successfully establish a brood stock of quail, *hatched and reared in confinement*, which will not only produce eggs satisfactorily but also hatch strong offspring that will thrive. We have yet to discover why it has proved impossible to keep quail over several generations in confinement. It is this which has been the unsolvable problem, and it is this on which we are experimenting.

#### *Wilbraham Game Farm.*

At the beginning of the year work was undertaken to remedy deficiencies of equipment, resulting in greatly increased rearing facilities. The benefit of this was reflected in the season's production, which was not only larger but also a larger percentage of the hatch was reared to liberation age. All hatching was done by incubators.

The 498 adult pheasants at the beginning of the laying season produced 18,223 eggs, of which 13,192 were set in incubators and 4,935 distributed. 6,776 hatched, of which 3,007 were distributed, 32 held for later distribution, and 301 retained for brood stock. 136 adults were liberated, and 38 more set apart for later distribution. The 100 Chinese pheasant eggs bought to change the blood lines proved 81 infertile, and only 8 hatched.

The system of distribution by truck was inaugurated with most satisfactory results.

#### FIELD PROPAGATION.

Shaker Mill Pond and the three Stockwell ponds, held under lease, are in process of development for pond culture of food species.

#### *Stockwell Ponds.*

At the close of 1921 work of repairing the old dams built years ago for power and cranberry flowage, was under way and fairly well advanced except at the Arnold dam which flows the upper pond. Work on the latter started the beginning of the year and continued until stopped by hard freezing. Thereafter attention was turned to clearing off the ponds (grown up to brush) continuing through the winter and spring, and the shore line cleared of brush for raising the water. To properly clear the ponds will require another winter's work, but on a smaller scale. Further work can continue from now on, along with use of the ponds as they now stand. They have been flowed long enough to kill the upland vegetation, all elements possibly harmful to fish life have been leached from the soil, and the forms of water life suitable for fish food have been multiplied in great numbers. The ponds contain the blue gills from Pennsylvania placed therein in 1920, together with their progeny of two years, which have been seen in good numbers. 4,000 were removed in the course of the work and distributed locally. The ponds received the first stocking with breeding horned pout (salvaged stock) this year, comprising 525 medium sized adults from Ashburnham, and 900 of larger size from Watuppa Lake, Fall River, and 22,000 fingerlings reared at Sutton (seined as fry from Watuppa Lake).



*Shaker Mill Pond.*

Though permission from the owners for the use of this pond had been granted, lack of funds had prevented its development for our use. As the name implies, this was formerly a mill pond. The dam, sluices, gates and other remaining works, still in fairly good condition, were repaired and remodelled and retaining pound and holding ear added. There was added to the stock already in the pond 80 large horned pout from Hubbardston, with 50 from local sources, and 25 blue gills salvaged in Tewksbury. The horned pout appear to have bred well, for small ones by the hundred were visible about the shores in late summer. No distributions were made.

## GAME BREEDING BY PRIVATE ENTERPRISE.

Summary of the reports of licensed game breeders show for 1921: reports filed, 283; number of birds or animals hatched, 5,560; number reared, 3,453 (886 pheasants, 2,015 ducks, 505 geese, 11 quail, 34 skunks, 2 fox); number on hand at end of the year, 4,423; number sold, exchanged or given away for food, 439, and for propagation, 864; eggs sold, exchanged or given away, 1,187.

Figures for 1922 are not yet compiled.

**FISH AND GAME DISTRIBUTION.**

## FISH DISTRIBUTION.

There were no radical changes in fish distribution methods.

Distributions are shown in the tables at the end of this section to which reference is made to supplement the following reports on the species put out. No figures are given below which may readily be found in the tables.

*Brook Trout.*

Eyed trout egg planting was continued for the third season. Periodical visits were made to inspect the results, and in general satisfactory results noted.

A large portion of the fingerlings were distributed by truck, and many associations and individuals called at the stations for their allotments. By this practice the State is saved considerable expense; the fish reach the waters in stronger condition; and the labor at the stations is reduced.

While the majority of applicants express satisfaction with the quantities of fish sent them, there are always a certain number who indicate their displeasure at the size of allotments. It may be enlightening to compare "the good old days" of about 1893 with the present. When the little fry station at Winchester served the entire State, the process of securing an allotment for Berkshire county, for instance, was about as follows: on notification that the fish were ready, a collection would be taken among the sportsmen to defray the expense of a trip to Winchester. The chosen messenger left the day before, spent a night in Boston, and returned next day with one, or occasionally two small cans of fry. This style of can held not more than 600 tiny fish, and had in the top an inverted, bell-shaped arrangement into which a small piece of ice was placed to keep the water at an even temperature in transit. The only way of aerating the water was to dip it out with a teacup and let it run back into the can. Reaching North Adams in the afternoon the fish were viewed by assembled sportsmen, then loaded into a team and taken around to the various brooks, into each of which would be tenderly placed a few of the tiny fish, — often to be washed away in the first hard rain. Today five stations supply the State, so located that long-distance shipments are a thing of the past. The fish (averaging 2 to 6 inches) now travel in 40-quart cans and in charge of a trained messenger, supplied with aëration pump, thermometer and plenty of ice. Under present methods few fish are lost, for they are in the brooks within a few hours after leaving the hatchery.

*Pike Perch or Wall-eyed Pike.*

The pike perch egg collections in Vermont (costing \$663) yielded as Massachusetts' share 7,350,000, which were shipped to Palmer Hatchery for hatching, and thence distributed.

*Small-mouthed Black Bass.*

Stock collected by the seining crew, together with the Palmer Hatchery product, comprised the stock for planting.

*Horned Pout and Catfish.*

Through the courtesy of the Vermont Fish and Game Commission we received 30,000 horned pout fry, and from a private pond in Massachusetts purchased 87,000 horned pout fingerlings. The full number of fry were distributed, and 75,033 fingerlings (balance held for spring). The Pennsylvania Department of Fisheries contributed 2,680 catfish which were planted in the Merrimack and Connecticut Rivers. From the commercial fishermen of Lake Erie we purchased a carload of 12,263 silver and channel catfish ranging from 6 inches to nearly 2 feet. They came in one of the seven specially patented fish cars of the Lieberman Live Fish Company of New York City, one of the officials accompanying and caring for the fish. The Ohio Fish and Game Division made the local arrangements. The car was unloaded at Springfield, Mass., and distributions made to the Connecticut, Merrimack, Chicopee, Manhan, Quaboag and Agawam rivers; and to Crane's Lower Pond, Southwick; Watershops Pond, Springfield; Five Mile Pond, Springfield; Nine Mile Pond, Wilbraham; and Congamond Lakes, Southwick. In the absence of any authority on the part of the Division to make regulations to protect introduced species we are obliged to rely on the honor of the fishing public to put back any of this stock caught in fishing. It is to their interest to do so, for it is introduced primarily as brood fish to produce a supply for future capture. Mixed in with the catfish were 1,085 adult horned pout, 400 of which were distributed and 685 sent to Palmer Hatchery.

This, together with the Palmer product, and a few salvaged horned pout, constituted the supply for planting.

*Brown Trout.*

The year's product from Palmer and Sutton was divided between the Quaboag River, Konkapot River, Miller's River, and Middle Branch of the Westfield River, following the plan on which brown trout fisheries are being developed in certain selected waters.

*Blue Gill.*

Stockwell Ponds, Sutton Hatchery and Kings Pond, Plymouth were the sources of the blue gill distributions.

*Alewife.*

The following plantings of adult alewives were made during the spring run in continuation of the effort to re-establish formerly good, but now depleted, fisheries: Monponsett Ponds, Halifax, 1,548; Robbins Pond, East Bridgewater, 484; Nippenicket Lake, Bridgewater, 724.

*Smelt.*

The only distribution was 3,000,000 fry, the product of experimental work at Weir River, Hingham, into which waters they were allowed to pass.

*White Perch.*

The seining and re-distribution of white perch was resumed (omitted last year from lack of funds). See "Fish Salvage" following.



*Fish Salvage.*

This year the two-ton Stewart truck long needed for the salvage work was purchased, which, with the equipment already owned, gives us the long-planned-for salvage unit. With this easy means of transportation of equipment and crew at hand, the extension of the salvage work will naturally follow.

Salvaging of white perch started at Tashmoo Pond, Vineyard Haven, on March 28, with a crew of four men, three from our own department and one from the New Hampshire Fish and Game Commission whose services were given in exchange for a share in the catch. Shipping started April 3. Fish have been taken from this pond for four years past, and the supply had become reduced and difficult to take in numbers. On May 2 operations were transferred to Squibnocket Pond. Fyke traps were employed as usual, but for some unaccountable reason did not fish well, making it necessary to catch eighty per cent of the fish by sweep seine, — very strenuous work in a pond where the grass and culch grow thick. Ofttimes upwards of a ton of this culch would be hauled in a sweep, requiring the crew to work for hours in the cold water, separating and sorting the fish from it. The adverse conditions made it necessary to work sixteen hours each day to keep up the supply for shipments. The work was closed May 24. Distributions of white perch were 75,200 (with 13,200 shipped in addition to New Hampshire).

On June 10 operations were started at North Watuppa Lake, Fall River, and continued until the 24th with three men. This is a water supply of Fall River, closed to public fishing. The rough character of the bottom makes seining impossible, and the adult fish are taken with hook and line. The tiny fry are collected with dip nets. The work resulted in 70,500 small mouth bass fry (distributed), 45 adult small mouth bass (distributed), 22,000 horned pout fry (sent to Sutton Hatchery for rearing), and 23,000 yellow perch fingerlings (distributed). The high water from spring rains made conditions very unfavorable for taking fry.

July 17-18 King's Pond, Plymouth, was seined for blue gills, and 1,400 secured and distributed.

Sept. 11 to 23 North Watuppa Lake was fished again, resulting in 900 horned pout breeders (shipped to Sutton Hatchery and later transferred to Stockwell Ponds as brood stock); 50 adult small mouth bass (shipped to Palmer Hatchery as breeders), and 140 adult small mouth bass (distributed).

Throughout the season small salvage jobs by wardens yielded various small lots of adult fish.

Seining investigations were carried on to locate sources of fish for future work.

*GAME DISTRIBUTION.*

The past year has brought about something of a revolution in methods of allotting and distributing game. The folly of liberating stock in covers unsuited for it is obvious, but has occurred to some extent through absence of proper information and the demands of the public. A survey was made of the actual square mileage of suitable pheasant cover and chartered on maps, and allotments to each county were based on the proportion of suitable pheasant cover therein to the total amount to be liberated. Distribution work in future will be more and more along these lines.

Truck delivery of the product of the bird farms proved a tremendous advance over the old method of shipment by rail. The truck was run on a regular schedule, applicants having been notified when and where to meet it, and thus 500 or 600 birds could be delivered in a day. At the game farms the new method cleared the brooders and yards quickly, making room for the new hatches as they came along in rapid succession, and eliminated losses from crowded conditions; it relieved the superintendents of much labor and clerical work in connection with the shipping, at the season when the volume of actual rearing work is at its peak; the birds went into the covers in much better condition only a few hours after leaving the game farm and without being weakened by the long trip in a hot and airless baggage car.

There were 48 young quail purchased and liberated.

The usual purchases of northern white hares in Maine were made to the number of 1,110. A survey of white hare cover was prepared, and future distributions will be made on the plan of apportionment followed for pheasants.

*Fish Distribution, 1922.*

SPECIES AND SIZE.	Product of State Hatcheries.	Secured from Other Sources, as Seining, by Gift, Purchase, etc.	Totals.
Brook Trout:			
Eggs <sup>1</sup>	- <sup>1</sup>	-	- <sup>1</sup>
Fingerlings	1,200,775	-	1,200,775
Adults and yearlings	3,860	150	4,010
Brown Trout:			
Fingerlings	1,330	-	1,330
Yearlings	638	-	638
Small-mouth Black Bass:			
Fry	149,000	70,500	219,500
Fingerlings	16,025	-	16,025
Adults	16	1,410	1,426
Large-mouth Black Bass:			
Fingerlings	10,725	34	10,759
Yearlings	60	-	60
Catfish:			
Adult	-	14,943	14,943
Horned Pout:			
Fry	-	30,000	30,000
Fingerlings	6,240	75,033	81,273
Adult	25	976	1,001
White Perch:			
Adult	-	75,200	75,200
Yellow Perch:			
Fingerlings	-	23,000	23,000
Pike Perch:			
Fry	7,175,000	-	7,175,000
Blue Gills:			
Fingerlings	-	5,400	5,400
Adult	-	25	25
Pickarel:			
Fingerlings	243	33	276
Adult	-	175	175
Alewives:			
Adult	-	2,756	2,756
Smelt:			
Fry	-	3,000,000	3,000,000
Totals	8,563,937	3,299,635	11,863,572

<sup>1</sup> 477,000 eyed eggs were planted in brooks to hatch naturally.

*Game Distributions, 1922.*

SPECIES AND SIZE.	Product of State Hatcheries.	Secured from Other Sources, Purchase, etc.	Totals.
Pheasants:			
Eggs <sup>1</sup>	- <sup>1</sup>	-	- <sup>1</sup>
Young	6,737	-	6,737
Adult	298	-	298
Wood Ducks:			
Eggs <sup>2</sup>	- <sup>2</sup>	-	- <sup>2</sup>
Young	110	-	110
Adult	1	-	1
Quail:			
Young	-	48	48
Mallard Ducks:			
Adult	-	17	17
White Hares:			
Adults	-	1,110	1,110
Totals	7,146	1,175	8,321

<sup>1</sup> 7,663 pheasant eggs were distributed from the State Game Farms.

<sup>2</sup> 12 wood duck eggs were distributed from the State Game Farms.



## MARINE FISHERIES.

### INSPECTION OF FISH.

By certain amendments to the fish inspection law, recommended by the Inspector of Fish last year, he and his deputies are now empowered to enter any places where fish is stored and sold and to destroy such fish as is unfit for food. The sale of fresh fish by grades, and the selling of fresh and frozen fish only under truthful names and grades, is made mandatory, and number three fish may be sold only at wholesale, and then only for splitting, salting and otherwise preserving. In the seizure and condemnation of fish found unfit for food the Inspector and his deputies are given wide authority and these changes have gone far to increase the effectiveness of the work.

Two permanent deputies comprise the inspecting force, Mr. Fred R. Niven being added to the staff April 1, 1922.

### *Work of the Deputies.*

A plan of State-wide fish inspection was carried out, by which every store, as far as known, selling, handling or storing fresh or frozen fish, received at least two visits. The wholesale fish establishments at the Boston Fish Pier and on Atlantic Avenue received weekly and in some periods daily attention. The carts of the 150 fish peddlers who purchase their fish at the Pier on Thursdays were carefully inspected weekly, as well as the fish they bought for house to house sale.

Another feature was the inspection of fresh mackerel, halibut and swordfish brought from Nova Scotia by the steamers from Yarmouth, and of fares from Nova Scotia landed by both Nova Scotian and Massachusetts crafts. The need of such inspection is shown in that some 2,087 pounds of fish were condemned and destroyed, while many thousands of pounds were passed as "second grade fish."

The weekly inspections of the out-door markets on Blackstone Street were continued; very frequent inspections were made of fish stores in Boston and some cities; all the public cold storage plants received attention from time to time; and certain extra inspections were made on the request of health boards. As a result of more frequent inspections than last year it was possible to note a gradual and continued improvement in the grading of fish foods offered the public.

### *Inspection at Producing Points.*

The Inspector of Fish personally inspected fisheries conditions at Boston, Gloucester, New Bedford, Nantucket and Cape Cod, besides making visits to retail markets in several large cities in order to keep in touch with the general situation and form an opinion as to the results of the work. At Nantucket a careful study was made of the flounder fishery, which has attained large proportions.

### *Splitting Fish Offers a Problem.*

From May 1 to October 1 the Inspector of Fish on request of the dealers, spent on an average of two or three days a week at Gloucester, where during that period over 25 millions of pounds of fresh cod and haddock were landed for splitting and salting. Here the wholesale curers and shippers of salt fish have continued their efforts to improve the quality of fish landed.

### *Fish condemned.*

An event with a direct bearing on the inspection of fish fares for splitting purposes was the action of the State Inspector of Fish in stopping the landing at Gloucester of a very large fare of fresh fish which he decided under the statutes was not "fish suitable only for splitting and salting or otherwise preserving." This lot, estimated at 225,000 pounds, was the first large amount barred from

food consumption under the fish inspection law and possibly the first fresh fish fare condemned in this State. The steam otter trawler *Sheldrake* of Rockland, Me., arrived June 10 from a fresh fishing trip, with a fare estimated at between 325,000 and 350,000 pounds. The *Sheldrake* left Rockland Wednesday, May 31 with only 35 tons of ice, secured her fare on Western Bank and began discharging on Monday, June 12. As the inspector was obliged to be at the State House on that date he did not see the discharge of the first of the fare, but on visiting the craft early Tuesday morning noted that the fish were "coming out soft", although apparently sweet. Lack of sufficient icing was very apparent, however. As the discharge of the fare continued the condition of the fish approached the "border line". Other pens were then broken down, but instead of disclosing better fish, the quality was worse, indeed the "unsuitable" stage was clearly reached. The odor was noticeably bad and ice was lacking. Fish broken open and stripped were sour and unfit for food in any form.

The Inspector then ordered further landing of the fish for food to cease. Subsequently, owners refused to accept the fare after condemnation in Massachusetts and it was dumped at sea. The action of the Inspector was endorsed by the large concern which had bought the trip and after discharging was stopped, even the agent of the craft admitted that the fare was in "bad order". This action had a materially good effect on the conditions of fresh fish fares landed for splitting during the summer season.

As a result of the year's fish inspection work practically 282,000 pounds of fish intended for food were condemned. In cases where it was felt that the gravity of the offense warranted, the offenders were made defendants in court cases. Had every case been prosecuted, the time lost in court attendance would have materially handicapped the work of inspection. In several instances city and town Boards of Health asked and received our deputies' assistance in inspections of their markets and court work. In many cases the services of the deputies were asked for by the dealers themselves.

#### *Decision on "Jellied" Swordfish.*

For some time past differences of opinion have been expressed as to the fitness of "jellied" swordfish for food. In all cases which have come to the attention of the Inspector of Fish or his deputies they have immediately condemned the whole fish. In order to test the strength of their position the Inspector of Fish on September 12 had Dr. David L. Belding, Biologist of the Division, together with a deputy fish inspector, visit the Boston Fish Pier where two samples of jellied fish were taken. Dr. Belding recommends in his report, as the result of his findings, that any swordfish showing the slightest evidence of honeycombed muscle should be condemned as food since muscle necrosis and degeneration are well under way when this appearance is noticeable. The apparently solid flesh in other parts of a "jellied" fish should not be sold for food since in all probability degeneration, undetected by the naked eye, has already begun.

#### THE DEEP SEA FISHERIES.

The marine fisheries story of Massachusetts for 1922 is far more pleasing to relate and much more encouraging to hear than that recounted for the willing-to-be-forgotten previous year. Generally speaking, the fisheries industry of the State for the past year has shown an increase in catch in several lines, an increased volume and quickening of trade and correspondingly better financial returns. True in some branches the operators considered themselves lucky to break a little better than even, but when compared with the dismal story of 1921 the upward trend is surely not only noticeable but in a measure substantial. Taken as a whole, fish from the vessels have sold at slightly lower average prices than the previous year, while the landings have been in good volume. There has been evidenced on the part of producer and shipper alike a strong endeavor to improve the quality standard and greater attention paid to marketing fish in better condition.



*Fresh Fishing or Haddock Fleet.*

The winter operations of the haddocking fleet were marked by unusually bad weather at sea, which made for a short catch and generally good prices. Plenty of fish were reported but it was impossible to set trawls for sometimes a week or more on a stretch. The vessels were badly buffeted and suffered considerable loss of trawls and sustained much damage. During December severe weather caused a short catch and groundfish prices at the Boston fish pier were high in consequence. Gales and boisterous seas continued throughout January and in consequence of the light receipts, haddock sold as high as \$15.15 per hundredweight and codfish at \$16. Extreme cold weather and heavy gales continued on the fishing grounds through February. Groundfish, however, were in better receipt than during January, but the vessels still profited by high prices. During the second week in February fish struck on Georges and the vessels brought better fares with corresponding decline in price.

Fish continued in heavy receipt during March and 4,000,000 pounds or more went to the splitters. April opened with the supply light and good prices, the closing week of Lent, however, finding fish in good supply. During the last half of the month, groundfish were in considerably lighter receipt and haddock generally sold at good prices. The operations through April closed what is generally known as the winter season. During the summer the fleet generally brought in good fares, frequently as usual having to sell them to the splitters. There were several occasions however during the summer season when the demand and prices were unusually good.

In October the winter season commenced with a large fleet in operation. The vessels met with fair success and at times found good markets for their catches. The steam otter trawling fleet was suddenly increased to almost full size and the latter part of November found 24 of these crafts operating.

In early November, because of heavy weather, groundfish was again in light supply and haddock on one occasion soared to the mid-winter figure of 15 cents per pound from the vessels.

The haddocking year produced better than an average year's catch, but prices to the fishermen were somewhat lower than 1921 and the year was not one of profit generally to vessel owners and fishermen.

*Swordfishing Fleet.*

The swordfishery of 1922 will go down in the history of the industry as one of the best on record. The season opened considerably in advance of last year, fish appearing in goodly quantities off the southwest part of Georges early in June.

The first fish was landed at New Bedford by Captain Sam Jackson of Edgartown, on or about June 17; and on June 22 Sch. Hazel R. Jackson, Captain Robert Jackson, arrived at Boston with 86 fish, taken 25 miles southeast of Nantucket Shoals Light Ship, in 50 fathoms of water. The fish sold for 32 cents per pound and the crew shared \$346 to a man. July fares were all caught on the southwest part of Georges in 40 to 70 fathoms water.

During the entire season small boats operating off Block Island and No Man's Land, continued to find fish in varying quantities, but the main body of the school remained on the Southwest part of the bank all through June, July, and up to August 20, at which time moving in a northerly direction, crossing the bank west of the "North Shoal", were next located off the northern edge in Lat. 42° 10' to 42° 15' extending eastward to the "Northeast Peak." All through September good catches were made on these grounds despite the fact that blowy and thick weather prevailed the greater part of the time.

American boats operating along the Nova Scotia coast through August and September met with poor success as the swordfish followed the herring schools into the bays and harbors out of reach of American fishermen, who are excluded from those waters by Treaty restrictions.

The outstanding feature of the swordfishery of 1922 is the fact that in spite of adverse conditions which prevailed throughout the entire season, the quantity and quality of this important food fish caught and marketed by our fishermen is far in excess of that of any season in the past.

### *The Mackerel Fishery.*

Notwithstanding that the mackerel fishery, as pursued by seining and netting crafts operating from Massachusetts ports was almost a total blank for practically the three months which in many seasons past have produced a large percentage of the total catch, it is gratifying to record increased landings to the extent of 10,000 barrels, fresh, over the returns for the 1921 season. The season's receipts of salted mackerel, 2,749 barrels, were the smallest with one exception since 1804, previous to which date there are no records available for comparison. In 1814, which it will be recalled was during a war with England, the landings of salted mackerel were but 1,349 barrels.

For practically the whole season small mackerel, commonly known as "spikes", "tacks", or "blinks" were in evidence in great body. These fish, in large schools, first reported by the southern netters and seiners in May, in June made their appearance on the Massachusetts coast, and hauls were made by traps at Cape Cod and along shore throughout the season. In September, October and November, seiners and traps made large hauls, fairly glutting the markets at times and causing the price to slump to such a low level that seining vessels desisted making catches. The traps continued to secure hauls well into November. During these Fall months the fish taken weighed 2 to a pound.

The southern season catch, all landed fresh, showed a gain of nearly 3,000 barrels over 1921. Late in May the entire fleet was operating off the Nova Scotia Cape Shore, leaving the netters in full possession of southern operations. These little crafts did well indeed as far as catch went, having several days of unusually large total landings, although prices at times were low. The southern catch was better than the average and the Cape Shore season opened with a total southern catch of 15,797 barrels fresh as compared with 13,192 in 1921.

Although more fares from the Cape Shore were landed than for many years, the average catch per vessel was smaller. An unusual feature of this fishery was the landing of eight fresh mackerel fares by Massachusetts seiners at Liverpool and Halifax, Nova Scotia, the catches being shipped to Boston or sold at the place of landing. The great bulk of the mackerel on the Cape Shore passed along close inshore, inside the three mile limit from which American fishing operations are excluded by treaty, and the Nova Scotia traps and netters profited to an unusual degree. So great was this catch that very large shipments, fully 13,630 barrels, poured into Boston via the Yarmouth steamer and even whole steamer loads besides were shipped for market to Portland and the Boston fish pier.

This great foreign influx naturally had its effect on prices so that while the fresh landings by home crafts, 1,353,900 pounds, compared favorably with that of three years out of the past six, yet the monetary return was smaller in comparison. The Cape Shore fleet brought but 2,344 barrels of salted mackerel, (the smallest in the history of this fishery,) as against 3,003 barrels in 1921.

Following their arrival home from Cape Shore the seining fleet cruised back and forth between the South Shoal Lightship and the Lurcher Lightship off the southwest tip of Nova Scotia, thence into the Gulf of Maine and around and all along the shore, finding few if any fish, and most of them hauled up in July. Some few of the larger vessels went to the far off Gulf of St. Lawrence in hopes of finding some fish there. In a small measure their hopes and judgment were gratified, but the catch as a total was very small.

During the last week in July 1,000 barrels of small mackerel were received at Boston from the Cape Cod traps and occasionally some small craft would arrive at Boston or Portland with a small fare for which splendid prices were received. On September 14th the shore fleet of small seiners which had been darting here and there and everywhere and finding nothing, ran in with the large schools of small



mackerel previously referred to and profited well thereby. Schools of these fish ranged from Middle Bank, along by Boon Island and the Isle of Shoals, into Ipswich Bay and also along Old Orchard Beach on the Maine coast. The seining crafts had no trouble in securing good catches, indeed the work of the fleet was limited only by the capacity of the market to take them away. This very unexpected but most opportune fishery lasted until November and in many cases proved what is known among the fishermen as a "life saver" to a season's work.

Late in November the mackerel netting fleet began its operations along shore. At the start the catches were small and the weather none too good, but later on conditions began to improve, the fish in their southerly migration came along in better numbers and as a result the fall netting fleet prospered splendidly, the catch by these small crafts up to November 30 being estimated at least 6,600 barrels.

The Massachusetts catches of fresh and salted mackerel from Dec. 1, 1921 to Nov. 30, 1922, inclusive, and for the corresponding period of the two previous years were as follows:

	Dec. 1, 1921, to Nov. 30, 1922.	Dec. 1, 1920, to Nov. 30, 1921.	Dec. 1, 1919, to Nov. 30, 1920.
Salt mackerel (barrels) . . . . .	2,749	3,242	4,897
Fresh mackerel (barrels) . . . . .	50,203	40,323	79,799
	52,952	43,565	84,696

*Cape Shore Catches of Mackerel for Six Years.*

YEAR.	Arrivals.	Fresh Mackerel (Pounds).	Salt Mackerel (Barrels).
1922 . . . . .	48	1,353,900	2,344
1921 . . . . .	29	2,160,000	3,003
1920 . . . . .	30	1,290,000	3,217
1919 . . . . .	32	2,119,000	6,275
1918 . . . . .	38	1,689,000	7,558
1917 . . . . .	32	2,229,000	7,131
1916 . . . . .	24	1,161,000	3,718

*Salt Bank Codfishing.*

The salt bank codfishing fleet in numbers was the same as last year, six crafts being engaged. The catch, because of scarcity of fish on the usual fishing grounds from Quero to the Grand Bank of Newfoundland, was smaller even than last year and thus the financial return was proportionately unsatisfactory, not only to the fishermen engaged but to the dealers as well. From Gloucester there went four crafts, two at trawling and two at dory hand-lining. From Boston one sailing craft engaged, and a direct innovation in this line of work was furnished by a Boston steam otter trawler which also made two trips. Prices as compared with recent years were low.

*The Shacking Fleet.*

Nowadays the term "shacking" as applied to the summer fishery for groundfish, the majority of which catches go to the splitting knife to be made into salted fish, is a misnomer. There was a time when "shack" meant anything that could not be sold for market use. Today this is all changed thanks to the determined attitude of the salt fish dealers of Gloucester that fish to be accepted for splitting and salting must be of "market" quality. This fleet was favored with fairly good weather, outside of long continued spells of fog and landed a much increased total

over the previous year. The season, however, because of low prices, was not productive of much profit to either fishermen or vessel owners. The season's landings was in the neighborhood of 25 million pounds of fresh fish.

#### *Fresh Halibut Fleet.*

For the fourth successive year the fresh halibut fleet has enjoyed an unusual measure of good fortune, and "prosperity" and "success" are written large across the record of its operations from February to November. No fleet in the Massachusetts fish-catching flotilla has shown a more satisfactory catch and profitable financial return.

The total catch of the fleet was as large, if not a little larger than last year, while prices ranged from fair to high, seldom during the whole season falling to what could be actually termed low figures. The catch was approximately 5,700,000 pounds. The Massachusetts fleet this year numbered 27 sail, one more than last year, making it the largest in recent years.

One craft, which was among the catch and stock leaders of the fleet, made 10 trips in the season of less than 10 months, a driving record indeed. Among the leaders of the fleet the fishing was exceedingly even. The top-notch catch for one vessel for the season was 429,000 pounds, while the second in line weighed off 425,000 pounds and the third was close up with 419,000 pounds. As usual Boston was the principal market, the Massachusetts crafts landing about 4 million pounds of their catch at Boston fish pier. Portland proved a popular market also for our vessels as evidenced by the landings there of about 1,625,000 pounds.

#### *The Gill Netting Fleet.*

In the past few years, this fishery has seen a marked decline, so much so that while in 1921 some 18 crafts were engaged, this year found but seven or eight. Last December this fleet, which started operations in the September previous, found very good fishing, but suddenly catches dropped to a low ebb. Early in January small fares were landed, but owing to very bad weather and scarcity of offshore fares these little crafts received good returns for their labors. During the latter part of January, owing to unusually bad weather, the boats were able to go to the fishing grounds but few days and the returns therefrom were so poor that many of the crafts hauled up. These same conditions prevailed during February but in the latter part of this month the boats located the large schools of haddock. From March 1 to 15 the boats did fairly well, but fishing then became spotty and results and returns were generally poor. Early in April the same conditions continued and by April 25 the season was practically over with a total catch of 5,534,000 pounds.

The fishery this fall opened on September 28 and up to November 30 had been pursued by only seven or eight crafts. The October and November catch totalled about 1,900,000 pounds.

#### *The Flounder Fishery.*

The flounder industry as pursued by some 100 or more Massachusetts crafts has risen in the past few years to a point where it is attracting attention as one of the most prolific pursued in inshore or not too far-off waters. The headquarters of this fishery are Nantucket, Provincetown and Hyannisport. At Provincetown the total catch this year was about 9,000 barrels and about 1,000 barrels of lemon sole. The prices secured have been rather higher than in 1920 and in 1921. The fishing at Hyannisport started in on March 5th and continued until May 25th, the spring catch being about 7,000 barrels. This fall's fishing out of Hyannisport has been more than up to standard, about 2,000 barrels having been shipped to the New York market up to November 30th and the season was then estimated to be about half over. Prices had ranged high. The flounder year at Nantucket was remarkably successful, about 50 boats of large size operating from that port and the result of their season's landings there was 25,119 barrels. The fish were of



large size, very few small fish being taken as compared with recent years. Many crafts which make Nantucket their port headquarters, on securing the full trips did not stop at that port to ship, but landed their catches direct at the New York market.

The total flounder landings of the fleet at Nantucket, Hyannisport and Provincetown for the year aggregate 40,600 barrels, while the landings at New York direct aggregated 75% of the total Nantucket landings, or 17,000 barrels more. Besides the landings at the places above mentioned quite a large quantity of flounders were landed direct at Boston and Gloucester. A close estimate of the total catch of the season is set at 61,000 barrels, or 12,200,000 pounds, truly a home fishery to be encouraged and safeguarded.

#### *Salt and Frozen Herring Fleet.*

Despite the fact that several cargoes of salt herring and a comparatively small quantity of frozen herring were received at the Boston and Gloucester markets from outside sources during the winter of 1921-2, from bays on the south and west coasts of Newfoundland, but two Massachusetts crafts, both from Gloucester, engaged in this industry. In addition, one Nova Scotia schooner was chartered by Gloucester parties. The great bulk of the fares were landed at Gloucester and Boston. The landings at Gloucester and Boston aggregated up to March 31, 13,325 barrels of salted herring in bulk, 2,308 barrels pickled, 756 barrels of Scotch cure and 4,050 barrels of frozen herring — comprising the fares of 16 crafts. The Fall of this year found the Massachusetts fleet in this industry increased from two to five crafts, all from Gloucester, besides two chartered to Gloucester parties.

#### *Fishing Notes of Interest.*

For the first time in the history of the Massachusetts fisheries industry, "coals were carried to Newcastle" from the Pacific Coast via the water route. The difference between water borne and rail carrying freight charges was the reason for the arrival at the Boston Fish Pier on March 7 of the steamer Neponset, hailing from Pacific ports, via the Panama canal, with 852 boxes of frozen halibut, 2,990 boxes of frozen salmon and 25 barrels of salted salmon.

Along the coast during the summer, small or "baby" bluefish were in evidence, indeed it is hard to find a harbor, bay or estuary in which these sporty fish did not press themselves. Few were taken at Martha's Vineyard or Nantucket, but going to the eastward and particularly on the North Shore, from the Saugus River to the Merrimack River they were quite in evidence.

For the first time in its history Massachusetts received mackerel caught on the Pacific coast when on March 24, 15 boxes of these desirable fish, 120 pounds to the box, the fish weighing from  $1\frac{1}{4}$  to  $2\frac{1}{2}$  pounds each, were received at the Boston fish pier, the consignment coming from the southern coast of California. The fish, which were brine frozen, are reported to have come through in good condition and met with a ready sale. While not like our regular mackerel, (scomber scombrus) they were somewhat identical and yet more approached the "bull's eye" in identity. These fish were shipped direct to Philadelphia in a refrigerator car and thence to Boston by fast express. Following this shipment, two other small lots were received by Boston fish merchants during the winter season.

During the summer the coast from Boston to Newburyport, and to a lesser extent on some sections of the south shore, was fairly alive with monstrous schools of porgies. These fish were followed naturally by a large fleet of porgy steamers, as many as 18 operating at one time from Nahant to Cape Ann. They made very large catches as the fish were easy to take. Some of the shore fishermen complained bitterly that these porgy seiners in their operations destroyed considerable fishing gear in the way of lobster traps and gill nets. Good hauls were also made by traps and shore boats and several thousand barrels were placed in cold storage for bait. The lobster fishermen also secured a goodly quantity for bait.

*Cape Cod Activities.*

An improvement in the Cape Cod fisheries is noted. At Provincetown the traps did very well. The fish most plentiful were mackerel and butterfish and the catches of these, instead of going to the freezers, because of the good market demand were shipped fresh daily. The traps at Provincetown and Truro made fair catches every week after July came in, and some satisfactory hauls were made before this date.

Herring and whiting, combination food as well as bait fishes, were quite scarce, comparatively speaking, while squid was also not in much receipt. However, it is figured that the Provincetown and Truro freezers found their bins stocked to from one half to two thirds capacity, an improvement over the dismal 1921 showing.

At Chatham and to the westward, the season's fishery was below the average, in fact very poor. Around Brewster and up the North Shore, to the Cape Cod canal the traps did well on butterfish and mackerel, while Dennis and Hyannisport traps shared the fate of those at Chatham, the catches being less if anything, indeed experienced fishermen at Chatham and to the westward figured it their poorest season for 20 years.

In Cape Cod Bay good mackerel catches were recorded. The traps near the Cape Cod canal made good hauls and also good lifts of large sized butterfish, these latter hauls continuing into late in the season. Mackerel, were quite plenty in Plymouth waters during all the summer and fall and afforded good handline fishing.

*Buzzards Bay Fisheries.*

From the standpoint of the wholesaler the Buzzards Bay fisheries, together with those which make their headquarters at New Bedford, was a failure, as it was in 1921. Although some landings showed improvement, the Buzzards Bay traps as a whole are reported to have taken less than they did the previous year.

At New Bedford this year, 1,300 barrels of fresh mackerel were landed from vessels which took them in adjacent waters as against 800 barrels in 1921 and 7,000 barrels in 1920. About 1,200 swordfish were landed at New Bedford this season weighing about 235,000 pounds as against 650 fish in 1921 and 1,000 fish in 1920. These fish above mentioned were caught outside of Buzzards Bay, but were marketed at New Bedford.

The boat fishermen and trap men of Buzzards Bay, however, feel that they caught a very fair amount of fish of various kinds such as scup, mackerel and tautog during the season, besides a large quantity of fish that were used for scientific purposes at the Marine Biological Laboratory at Woods Hole.

The handline fishing boats had the best fishing for codfish, striped bass and black-fish for a number of years. A considerable quantity of striped bass were caught in the traps in the north shore of Buzzards Bay.

Taking it all in all the Buzzards Bay fishing this season, in the opinion of the boat and trap fishermen, has been very fair.

*Martha's Vineyard and Nantucket Fisheries.*

Outside of the excellent fishing enjoyed by the flounder fleet, the fisheries prosecuted from Nantucket this year were of a not very satisfactory yield. The traps did not have a very big season. Mackerel have been very shy in waters contiguous to Nantucket, and summer flounders or flukes were in fair receipt the last part of the season.

A new branch of fishery was started at Nantucket this summer when two or three local boats engaged in catching sharks for a firm that makes leather from shark skins, landing 2,500 sharks during the season.

One boat engaged in sturgeon fishing but had a very poor season. This craft, the Eleanor May, Capt. Olaf Borgen, fished in Nantucket Sound near Tuckernuck Shoal for one month during the summer, securing only 30 fish.



The bluefish catch was very light and confined to the traps, the fish taken being small.

At Martha's Vineyard the spring run of alewives was about as usual, the catch aggregating 6,000 barrels. Prices ruled low and most of the fish taken before May went for bait. The May catch went to the scalers, the season ending unusually early, about May 20.

Flounders were plenty throughout the season but prices were frequently so low that some of the fleet was hauled up part of the time. Cod and haddock fishing was also good but prices were so low that few boats engaged.

The unfavorable weather interfered greatly with a good summer catch of swordfish. During September and October, however, quite a number were landed at Edgartown. No bluefish were taken and scup, sea bass and flukes were very scarce. Some mackerel were taken by the netters in May and June but this fishery was a failure the rest of the season.

### *Boston Fishing Activities.*

The crafts of the fishing fleet marketing their fares at Boston made what can be called an average year's total of landings — 104,667,229 pounds, this total being but slightly short of the 1921 receipts, and does not include the several millions of pounds, which brought to this port, found no market because of over-plus production for the immediate moment and then were diverted to the Gloucester market for splitting and salting. With this latter amount figured in, the Hub total of fish hailings would have been well ahead of 1921, but for the sake of accuracy of statistics, it is computed in the Gloucester landings.

Though prices averaged slightly lower for the year and the landings too were less, the anomaly of a really better and more prosperous condition is truly presented, because mainly of the fact that trade has materially improved and marked improvement has been shown in three lines — the halibut, swordfish and fresh mackerel branches, all in the higher price class as a general proposition.

Codfish were in less receipt than in 1921, while haddock, the staple, was but 700,000 pounds behind last year. Fresh mackerel, swordfish and halibut, on the other hand, showed substantial gains.

Receipts of fish at Boston from the fishing fleet from Dec. 1, 1921 to November 30, 1922:

Large codfish (10 lbs. and over)	17,617,445
Market cod (those under 10 and over 2½ lbs.)	11,847,103
Cod scrod (those weighing 1 to 2 lbs.)	522,485
Haddock	54,325,044
Large hake (6 lbs. and over)	58,140
Small hake (under 6 lbs.)	2,891,918
Pollock	3,299,040
Cusk	1,034,202
Halibut	4,120,826
Fresh mackerel	2,977,666
Miscellaneous (butterfish, catfish, flounders, redfish, shad, smelt, herring, sturgeon, sharks, bonitas, swordfish, etc.)	5,973,360
	<hr/> 104,667,229

The figures in the preceding table are furnished, as in previous years, by Mr. F. F. Dimick, secretary of the Boston Fish Bureau, an authority on Boston fisheries matters.

### *The Gloucester Fisheries.*

An increase of approximately 3,000,000 pounds is noted in the receipts of fish at the port of Gloucester for the year 1921. This, in connection with a greater volume of export trade and improved domestic demand has produced a better feeling all around. The enactment of the protective tariff bill, it is felt, especially by fishermen and producers, will work for the benefit of the industry.

The policy of the curers and shippers of salt fish of placing quality above quantity production is being continued and the increased trade during the year is the best answer as to the value and worth of this stand. In this quality standard effort the shippers and curers welcomed and had the active and appreciated assistance of the state inspector of fish.

Both fresh cod and haddock have been in more generous receipt and this practically accounts for the better total showing over 1921. Receipts of salt cod are a little less than in the previous year. Fresh pollock landings show a large falling off as compared with the total 1921 receipts in this line. There has been a gratifying increase in landings of salt herring from Newfoundland. Fresh mackerel have been in better receipt, while the landings of fresh halibut were disappointing.

The following table gives the receipts from all sources at this port from Dec. 1, 1921 to Nov. 30, 1922:

Salt cod . . . . .	6,434,575
Fresh cod . . . . .	16,635,423
Halibut . . . . .	164,207
Haddock . . . . .	11,605,699
Hake . . . . .	2,306,803
Cusk . . . . .	858,562
Pollock . . . . .	3,035,755
Flitches . . . . .	23,742
Not product of Amer. fisheries . . . . .	10,696,273
	<hr/>
	51,761,039

Fresh mackerel (Pounds) . . . . .	697,476
Salt mackerel (Barrels) . . . . .	1,417
Fresh herring (Pounds) . . . . .	632,475
Salt herring (Barrels) . . . . .	14,261
Cured fish (Quintals) . . . . .	3,934
Small boats (est.) (Pounds) . . . . .	1,000,000
By rail . . . . .	- <sup>1</sup>
Flounders . . . . .	- <sup>2</sup>

Total, Dec. 1, 1921, to Nov. 30, 1922, 58,066,506 pounds.

#### SHORE FISHERIES.

Owing to the necessity of curtailing the bulk and costs of annual reports the tables of statistics hitherto published yearly in the Appendix are omitted. The totals alone are given of the returns from the shore net and pound fisheries for 1922.

Number of men engaged, 369; number of boats, 284; value of boats, \$95,492.00; number of fish pounds, 115; value of fish pounds, \$142,647.25; number of nets, 783; value of nets, \$19,370.50. Catch in pounds, —

Alewives . . . . .	352,095	Sea bass . . . . .	4,538
Bluefish . . . . .	19,901	Sea herring . . . . .	554,245
Flounders . . . . .	549,646	Shad . . . . .	5,479
Mackerel . . . . .	2,262,543	Squeteague . . . . .	5,818
Menhaden . . . . .	542,820	Striped bass . . . . .	3,076
Pollock . . . . .	80,207	Squid . . . . .	886,953
Salmon . . . . .	134	Tautog . . . . .	35,936
Scup . . . . .	48,235	Other edible or bait species . . . . .	5,678,503

Total pounds, 11,030,129; total value, \$296,877.92.

#### LOBSTER FISHERY.

The totals of the tabulation of the returns of the year's fishing, required of the lobster men by law, follow. The complete tabulation, hitherto published in detail, is discontinued by reason of the necessity of curtailing printing expenses.

<sup>1</sup> Included in sections of table given above.

<sup>2</sup> Included in small boats catch.

Number of men engaged in the fishery, 730; number of boats, 907; value of boats, \$183,804.60; number of pots used, 47,531; value of pots, \$119,735.60; number of lobsters taken, 1,561,260; pounds of lobsters, 2,341,882; value of lobsters, \$478,927.21; number of egg-bearing lobsters taken and returned to the waters, 21,343.

As required by Chapter 130, section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1922 was 1,112.

#### BOUNTIES ON SEALS.

The following towns were reimbursed by the Commonwealth for bounties paid on seals under Ch. 130, Gen. Laws, § 155: Barnstable, \$2; Chatham, \$2; Cohasset, \$2; Duxbury, \$28; Gloucester, \$4; Plymouth, \$12; Saugus, \$2; Yarmouth, \$28; fees to treasurers, \$20.

#### MOLLUSK FISHERIES.

A survey of the mollusk fisheries was made during the summer. Compared with the survey of 1907 it shows an improvement in the clam fishery, a decline in the oyster and quahaug, and little change in the scallop.

##### *Clam.*

Numerous changes since 1907 may be noted. The industry as a whole has declined as to number of men engaged and in total production, but the average yield per man for the important clamming centers has materially increased, owing to better prices and more abundant supply. In fact, the market demand in Essex County at times is insufficient to take the production. The individual flats have changed somewhat as to distribution of the set, and production in certain towns has increased or declined; but the supply as a whole has increased. The method of marketing has changed, the advent of the automobile having brought truck delivery and the wayside sale of clams.

Control of the clam flats in their respective towns was granted to Ipswich and Rowley for additional ten-year periods, by renewal of leases from the Commonwealth under Chapter 710, Acts of 1912.

##### *Scallop.*

The erratic distribution of scallops renders statistics of any one year of little comparative value. Weather conditions at the time of spawning and the severity of the following winter are the factors influencing the abundance of this mollusk. The 1921-1922 season as a whole, while above the average, was not especially noteworthy.

##### *Oyster.*

The oyster industry of New England has shown a decline during the past fifteen years, and the majority of Massachusetts oystermen are more or less pessimistic regarding its future. Except for the localities where oyster planting has ceased our statistics show that, in spite of a diminished production, the industry is still being carried on successfully. The 1921-22 figures are given in round numbers since estimates have been necessary in certain towns.

	1906-1907.	1921-1922.	Loss.
Leased area	1,774	1,850	—
Annual production in bushels	161,182	113,000	48,182
Capital invested	\$268,702	208,000	60,702
Men engaged	159	120	39



*Quahaug.*

The quahaug fishery shows an appreciable decline since 1907, which is indicated by the decrease both in the number of men and in the production. This change is chiefly confined to the north side of Cape Cod and Buzzards Bay. Since 1907 the value of quahaugs has increased, little-neck and sharp now bringing one dollar and more per bushel, and blunts forty cents. In spite of the increased prices, the values of the production in these localities have also appreciably fallen off.

## SHAD.

Efforts over many years to secure shad eggs from California for hatching in the hope of rehabilitating the shad fisheries of Massachusetts have been unsuccessful, and the costs are prohibitive. The most practical plan is to develop the remnant of the shad fishery that remains. A very small remnant of the once famous shad fishery of the Taunton River exists; a small number run up the Agawam River as far as the fishway at East Wareham; an occasional shad may be taken in Coles River, Swansea, and North River, Pembroke. It is noteworthy that for the first time in several years as many as 1,000 were taken in the Palmer River; hence this is the logical place to begin. In attempting to reach the Palmer River in Massachusetts the shad are obstructed by the fish traps in Narragansett Bay and the nets in the Rhode Island portion of the Palmer River. Our efforts over a period of years to secure legislation on the part of Rhode Island to permit the shad to reach Massachusetts waters culminated this year in the passage of an act prohibiting the taking of any shad in the Palmer River or setting of apparatus for catching fish, except hook and line, from sunset Saturday until sunrise Wednesday of each week, or to otherwise prevent the free passage of fish. This act was to take effect only on the passage of similar legislation in Massachusetts, — recommendation for which this Division made to the General Court of 1923.

## ALEWIFE.

The plantings of alewives in Monponsett and Robbins ponds were detailed under "Distribution." This is our effort to restore the fisheries in the streams leading to these ponds, now opened by fishways, but deserted by the alewives previously on account of obstructing dams. These efforts are bearing fruit, as proved by the presence of large numbers of young alewives in Monponsett Pond in 1921 and in the canal between the lakes, and the passage down stream of quantities of young in the fall of 1922.

All the accomplishments in the line of fishways installation is just so much accomplished towards the return of the alewives to the stream thus opened. The surprising number of alewives that appeared in the Merrimack, presaging a restoration of this fishery, has already been mentioned under "Fishways."

The dates of the alewife run at the most important alewife streams, with facts concerning the catches, and the sale prices, have been recorded in the office files.

Respectfully submitted,

WILLIAM C. ADAMS,  
*Director.*



## APPENDIX.

RECOMMENDATIONS TO BE CONTAINED IN THE FIFTY-SEVENTH ANNUAL REPORT OF  
THE DIVISION OF FISHERIES AND GAME FOR THE YEAR 1922.

The director respectfully recommends the passage of laws designed to accomplish the following purposes.

1. *To require a Fishing License to fish in all Inland Waters.* — The present law requires a license for fishing in only those inland waters which have been stocked by this department since January 1, 1910. The publication yearly of lists of waters stocked during the year involves considerable expense. Further, by reason of the fact that many streams are known by various names, much confusion is created in the minds of persons who wish to determine whether a stream has or has not been stocked. Many of the unstocked waters are being depleted and we believe they should be protected by requiring licenses for fishing therein.

2. *To make the Laws of Massachusetts relative to Migratory Birds conform with the Laws of the United States.* — The Federal Government has entered into a treaty with the Dominion of Canada for the uniform protection of migratory birds on the North American continent. The Federal laws of this connection render conflicting State laws void. Very often there is great delay in prosecuting cases in the Federal courts where business is greatly congested. It is desirable that the State laws conform with the Federal laws in order that violators may be prosecuted in either jurisdiction. The benefits of the Migratory Bird Treaty Act are already a matter of common knowledge, and should have this additional support.

3. *To allow the Commissioner of Conservation to take Lands by Right of Eminent Domain for Fish and Game Refuges and Public Fishing and Hunting Grounds.* — The land of the Commonwealth is held by a comparatively small number of its citizens. The expense of propagating fish and game is borne primarily by those who hunt and fish as the result of the license system. However, a part of the funds is provided by the general treasury. The wild life of the Commonwealth belongs to all its people, but it lives on the land and in the waters controlled by the comparatively few. Under our laws the land-owners have the right to exclude the public if they so desire. There should be some provision guaranteeing to the public permanent benefits from the annual investment of funds in this work. This protection can be best insured by establishing public shooting grounds, game sanctuaries and public fishing grounds which shall be open to the public at all times, under suitable regulation, on much the same status as our great ponds.

4. *To protect Shad in Palmer's River.* — This river flows into Narragansett Bay in the State of Rhode Island. At the last session of the Rhode Island Legislature a law was passed giving substantial protection to the shad in their annual run from the sea to their spawning grounds. This law is not to go into effect until similar protective legislation has been passed by the Commonwealth of Massachusetts.

5. *To allow Persons in Charge of Public Lands to issue Permits for the Hunting and Trapping of Predatory Birds and Animals.* — Under the present law all of the public lands are game refuges and for the benefit of the useful birds and animals within those reservations the persons in charge thereof should be empowered to issue permits allowing the hunting of predatory birds and animals which prey upon the birds and quadrupeds which are an economic asset.

6. *To prohibit the Sale of Trout and further protect the Brown and Rainbow Trout.* — For many years the sale of wild trout has been prohibited but when the general laws were revised in 1920 the phraseology was rearranged which makes it uncertain

as to whether or not the sale of trout is actually forbidden. All question should be removed by clarifying the act and the same protection should be extended to the brown trout and rainbow trout both of which are being propagated.

7. *To give the Director the Right to regulate the Taking of New Species of Fish and Game which he may introduce into the State for Experimental Purposes.* — The department is constantly on the alert to find new species of fish and game which will establish themselves and propagate in the streams, ponds and covers of the Commonwealth and the director should have the right to prohibit or regulate the taking of them during the experimental work. At the present time a new specie is at the mercy of the public as there are no laws to protect many kinds of fish and game. For illustration, — in the spring of 1922 twelve thousand channel catfish were brought from Lake Erie. A portion was planted in the upper part of the Connecticut River, a portion in the Merrimack River and some in several ponds. The channel catfish is not covered by our laws and until it is ascertained whether the specie will adapt itself to our waters it should be given such protection as will appear desirable. It is impossible to state in advance when the opportunity may be offered to obtain numbers of a given specie of wild life. Often after their introduction, should it be necessary to wait until the Legislature can take action, the specimen may be completely destroyed, under existing conditions, before sufficient safeguards can be thrown around them.

8. *To extend the Close Seasons on Pond Fish, to prohibit the Catching of them during the Winter, to provide a Close Season on Horned Pout and to prohibit the Sale of Pond Fish where that is not already provided for.* — The division is convinced that the present demands on our fisheries are such that winter fishing and the sale of fresh water fish must be prohibited if our waters are to continue to furnish a reasonable amount of fishing for the general public during the rest of the year. The horned pout is one of the most valuable food fishes in the Commonwealth and should have equal protection during the breeding season to that given other species.

9. *To allow the Department of Conservation to receive Property in Trust for the Propagation and Protection of Useful Wild Birds, Quadrupeds and Fish.* — There is a growing disposition on the part of those interested in conservation to turn over to the Department of Conservation lands and personal property, including money, to carry on the work. The purpose of this legislation is to put the department in a position to legally accept these gifts and administer them in a way to meet the wishes of the donors.

The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

*Mass.: Dept. of Conservation:*

DIVISION OF FISHERIES AND GAME

FOR THE

YEAR ENDING NOVEMBER 30, 1923

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DEPARTMENT OF CONSERVATION  
MASSACHUSETTS





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## The Commonwealth of Massachusetts

The Director of Fisheries and Game herewith presents the fifty-eighth annual report.

### GENERAL CONSIDERATIONS.

Stripped of romance and sentiment the protection and restoration of wild life is a business proposition, differing only as to details from that of the poultry grower and the stock raiser. In the former case, as in the latter, to insure success the operator must have exclusive control over the ground on which he is to work, and have at his disposal those facilities which will combine to give results.

Under our form of government, where the individual owns the land and the central government has but very little voice in the control of that land (outside of the exercise of police power), it is apparent at once that the fundamental requirement for successful restocking does not exist, — which is, the necessary control over the land on which it is sought to protect and increase wild life.

Two illustrations will suffice. Last year this Division distributed upwards of ten thousand English ring-neck pheasants in various parts of the State. The State, acting through the Commissioner of Conservation, then established regulations as to the period of open season, fixed a daily and seasonal bag limit, and limited the shooting to cock birds. This is as far as the State can go, but it falls far short of the fundamental requirement — such absolute control over the land on which the wild life was liberated as would insure the greatest annual production of birds from the breeding stock remaining in the open. The land on which the birds were liberated is owned by a large number of individuals. They have the exclusive control of it. They can cut down the forests, drain the swamps, burn over the brush covers and make a given area which was attractive to the birds when they were first liberated, a desert.

Last year the State planted approximately one and a quarter million brook trout fingerlings in the streams. In nearly every instance these are unnavigable streams. The riparian owners on either side own the land underneath to the thread of the stream, and, (excepting certain State regulations as to pollution) have complete control over that section of the stream, under the obligation to pass the water on in equal volume and purity to the riparian proprietor below. From source to outlet, therefore, the small group of riparian owners on the streams has exclusive control over the waters. All the Division can do is to plant the fish, and the Legislature regulates the taking. Here again the fundamental requirement is lacking, namely, the right to do those things necessary to make the stream support the largest amount of fish life. The riparian owners may cut down all the timber, resulting in warming up the waters and causing flood conditions which change the entire character of the stream, and in innumerable ways may reduce it to a ribbon of waste water.

As far as the future can be forecasted, there is no assurance that these conditions will change. So long as they exist, the business of protecting and propagating wild life over the State as a whole can never be carried on with the greatest efficiency and the largest present and permanent results. The State that can adopt methods giving the necessary control over at least a reasonable amount of its area, will have the largest amount of wild life, relatively speaking. The only method available appears to be by the establishment of permanent wild life sanctuaries, owned by the State, on which the business of protection and propagation can be conducted without interference. Two or three such sanctuaries should be established in every county. They should be of sufficient size for all practical purposes (a fair tract being 2,500 acres), and the boundary lines should be clearly defined and adequately posted. A sufficient force should be maintained to protect the sanctuary at all times against poachers, and to carry on systematic reduction of all species classed as vermin to a harmless minimum.

In addition, those things should be done to gradually put the sanctuary in a position to support the largest amount of all forms of desirable wild life. It would be very interesting to go into many details on this last proposition, but one or two will suffice. The sanctuaries should not be chosen as a lumber and firewood proposition, but primarily for the production of wild life. However, those areas suitable for reforestation should be cultivated to supply, say in twenty-five to fifty years, all of the wooded area required. Food-producing grains, shrubs and trees should be planted in favorable locations. Sections of rank vegetation should be sufficiently cleaned out to sweeten and renew the ground. By diverting streams or damming up spring holes breeding grounds for ducks should be made. It is safe to say that the possibilities of this State for the production of black ducks alone have never been fully visualized. There are thousands of acres upon which a black duck has not alighted for the last twenty-five years, which could and would support large numbers of them with adequate preparation of the ground and suitable protection throughout the entire year.

In these sanctuaries the artificial propagation of various species should be carried on as intensively as the character of the ground will permit. Those in charge could annually hatch a substantial number of ring-neck pheasant eggs. In certain sanctuaries numbers of semi-wild mallards could be produced (it being difficult to breed the black duck in captivity). These sanctuaries would be producing areas from which, from time to time, the excess amount of stock could be distributed in areas open to public shooting. On them the wild life would have better protection than could be given to the species generally throughout the State. Therefore, during a severe winter, when the quail might be reduced on the range generally, the flocks under special protection in the sanctuaries could be drawn on to help re-stock the range.

Today we rely on the importation of white hares to keep up the stock. Should a neighboring state legislate to prohibit the exportation of hares we would find it practically impossible to keep up the supply. There are many areas in this State admirably adapted to produce a large number of white hares from which a reasonable number could annually be distributed in other sections. These permanent wild life sanctuaries could likewise be used by the public for general recreational purposes, as for example, a limited number of camp sites under proper regulations and for winter sports, as well as for observation by lovers of the out-doors at such times as would not interfere with the breeding seasons.

#### PERSONNEL.

On November 28 His Excellency the Governor re-appointed William C. Adams of Newtonville Director of the Division of Fisheries and Game for three years.

#### FINANCES.

	Appropriations	Expenditures	Balances
For salaries and maintenance . . .	\$210,900 00	\$201,303 56	\$9,596 44
For special purposes . . .	4,750 00	3,586 97	1,163 03
Available from 1922 balances . . .	691 57	665 06	26 51
	<hr/>	<hr/>	<hr/>
	\$216,341 57	\$205,555 59	\$10,785 98
Balances available for next year . . .	. . .	. . .	1,149 13
	<hr/>	<hr/>	<hr/>
Returned to general treasury . . .	. . .	. . .	\$9,636 85

The revenue turned into the State Treasury was: license fees (details follow), \$188,658.35; sales at game farms and fish hatcheries, \$242.90; sales of game tags, \$52.50; sale of forfeited goods, \$397.04; sale of shanty at Monomoy, \$50; lease of Chilmark Pond, \$75.00; lease of clam flats, \$60.00; total, \$189,535.79.



*Receipts in Detail for Licenses.*

	Total Number issued	Gross Value	Fees to Clerks	Net Return to State
Combination licenses . . .	46,958	\$97,308 00	\$7,043 70	\$90,264 30
Hunting licenses . . .	40,411	57,119 75	6,061 65	51,058 10
Fishing licenses . . .	49,536	53,791 00	7,430 40	46,360 60
Lobster licenses . . .	1,142	1,142 00	171 30	970 70
	138,047	\$209,360 75	\$20,707 05	\$188,653 70 <sup>1</sup>

The endeavor of the past few years to make the Division approximately self-supporting bids fair to be realized, for comparison of expenditures with revenue shows the percentages of operating costs met through income from licenses and a few other sources to have been: 1918, 38.8%; 1919, 42.3%; 1920, 49.3%; 1921, 56.2%; 1922, 81.8%; 1923, 92%. We may also mention that the money value of the hatchery output and the product of the salvage unit goes far towards offsetting the operating costs.

The condition at the close of the present year is a strong contrast to that prior to 1909, at which time the Division was supported almost entirely by funds raised by general taxation. We are not relaxing our efforts, but have pointed out to the Commission on Administration and Finance several directions in which savings may be accomplished or more revenue produced through slight changes in the laws. Among these may be mentioned: special trapping license; stopping the free issue of duplicates of lost licenses; extending the fishing license provision to all waters. Further, by making licenses more easily procurable, and by encouraging the non-fishing and non-hunting part of the public, which yet is interested in wild life, to make its contribution by taking out licenses, the income from this source would be swelled.

A radical change was worked out in methods of keeping license records, to go into operation in 1924. It simplified the records of both the town clerks and the central office, and will mean a yearly saving to the State of many dollars in clerical work, postage, and costs of material and printing. The size of the license is reduced from 102 square inches to 27 square inches, which will give a 75% saving in paper stock alone, with savings on printing and other expenses in proportion.

## CONFERENCES.

The annual conferences between sportsmen, fishermen, bird lovers and the officials of the department, for discussion of proposed legislation, were held in Middleborough, Worcester, Springfield, Pittsfield and Boston, on lines similar to other such meetings.

## ACTIVITIES OUTSIDE THE STATE.

The Conservation Commissioner and the Director were present at the Ninth National Game Conference of the American Game Protective and Propagation Association on December 12 and 13, 1922, which is the annual gathering of the game breeders of the country. The Director attended the meeting of the Advisory Board to the U. S. Biological Survey of the Migratory Bird Treaty Act, of which he is a member, in Washington, D. C., on Dec. 14, 1922; the meeting of the American Fisheries Society Sept. 17-19, and of the International Association of Game, Fish and Conservation Commissioners, of which he was President, the 20th and 21st, in St. Louis, Mo.

## COURTESIES.

We are indebted to a large number of individuals and organizations for co-operation and courtesies which have made our work easier, more effective or more far-reaching. We are duly sensible of the value of such helpfulness, though it is impossible to give individual mention to each case.

<sup>1</sup> There was also a net amount of \$4.65 paid in on account of a short payment in preceding year.

## ENFORCEMENT OF LAWS.

No material changes were made in the law-enforcement program or methods, and but one in personnel. Warden Orin D. Steele of Quincy resigned to accept a position as U. S. Game Warden and was succeeded by Forrest S. Clark.

Despite the encroachment upon law enforcement work of the increasing activities of the division in which the wardens are engaged in various capacities, the number of cases very nearly equalled the previous year, and the fines imposed were \$2,382 in excess of last year.

Number of cases, 534; convicted, 505; discharged, 29; (filed, 84, appealed, 21); fines imposed, \$8,481; costs paid, \$115. This does not include the cases presented to the Federal courts through the Federal warden, evidence for which was secured by the State wardens.

Licenses revoked: resident combination, 58; resident hunting and trapping, 31; resident fishing, 27; alien fishing, 8; alien hunting and trapping, 2; total, 126.

Violations of the lobster laws continue to hold front rank. 34 cases of taking "short lobsters" netted \$1,522, while 26 violations of other lobster laws, particularly fishing without a license, brought in fines aggregating \$1,200. The largest number of violations of any particular law was in the case of fishing inland stocked waters without a license. Under this charge 123 cases were brought to court, and \$995 collected in fines. Next in line comes hunting without a license, with 70 cases totalling \$580 in fines. It is now quite generally known that hunting and fishing licenses are required, and most of these cases can be attributed to carelessness or indifference.

The advent of Sunday sports had developed somewhat the erroneous idea that hunting on Sunday is allowable but 33 persons who contributed \$260 in fines for this offence now know otherwise.

The alien hunter still presents a problem in the enforcement of the game laws. 21 aliens were haled before the courts for the unlawful possession of firearms and they were fined a total of \$800 in addition to the loss of the firearms found in their possession. In addition, among the 39 cases of killing protected birds for which fines of \$795 were imposed the majority were cases of song-bird killing by foreign-born hunters.

Under the fishing laws violations of the trout appeared most numerous as 18 convictions under this heading brought fines of \$225, while violations of the pickerel laws numbering 17 cost \$51. Violations of the shore fisheries laws were also handled successfully as 11 violators of the scallop laws were fined \$188, 5 of the mackerel laws were taxed \$125 and 24 cases of illegal seining or trawling cost violators a total of \$315.

The oft-violated requirement of law that a hunting or fishing license shall be shown on demand of any person was sustained with a \$10 fine in a case complained of by a land-owner.

### EQUIPMENT.

No greater contribution to the organization's efficiency can be noted than the addition of five new Ford touring cars during the year, bringing the total of state-owned cars to 14. The value and necessity of a motorized warden force has long been recognized, and this increasing percentage of motorization presages good results in this branch of the work in the future. However, to assure the best results and a standardized policy of operation each warden should have a state-owned machine.

The division operated two small power-boats during favorable weather which did good work in suppressing violations in the harbors, bays and rivers along the coast. Supplementing these was the Steamer "Lotus" of the Department of Public Safety, and because of the generous co-operation received from the officers of that department it was possible to apprehend many violators in the open waters into which the small boats could not venture. Several small boats with out-board motors attached, located in lakes and streams in different parts of the State, likewise did good service. The accumulated experience of years emphasizes the need of one or more specially constructed boats for patrol work along the shore.



## CO-OPERATION.

While the result of public co-operation has been noted above in a general way, more specific mention may well be made of the assistance received by wardens from the various local police departments. The demands of brevity will not allow a recital of the instances in which these officers — and in some cases deputy wardens on our volunteer force, were responsible for or materially aided in the apprehension and prosecution of violators. The U. S. Game Warden for this district availed himself of every opportunity to be of assistance, and our appreciation of this found expression in the many instances where our wardens detected and reported violations of the federal migratory bird laws.

## LEGISLATION.

Laws to accomplish the following were enacted by the General Court of 1923:—  
Chapter 15, to repeal the special smelt law in the town of Rowley.

Chapter 35, to prohibit the use of beam and otter trawls in certain waters adjacent to Martha's Vineyard.

Chapter 68, to place the burden of proof on aliens to show their right to possess firearms or secure a license.

Chapter 99, to prohibit the use of all snares for taking animals.

Chapter 144, to allow cities and towns to pay their local fish and game wardens not exceeding \$100 per year.

Chapter 182, closing the season on quail in Hampshire, Norfolk and Worcester counties until 1925.

Chapter 185, to require trappers to report annually to the fish and game division.

Chapter 212, to place a close season on pike perch between February 1 and April 30, a 12-inch catch limit, and to prohibit sale.

Chapter 268, to prohibit sale of all fresh-water fish; to make permanent the 12-inch law on pickerel; to place a close season on horned pout from March 1 to June 15 and on yellow perch from March 1 to April 1; to change the catch limit of white perch from a weight basis to a numerical basis.

Chapter 269, to prohibit the sale of brook trout and place an 8-inch catch limit on brown and rainbow trout.

Chapter 301, to authorize the Commissioner of Conservation to accept in trust gifts of land and money for fish and game work.

Chapter 307, to make the state laws relating to migratory birds conform with the federal regulations. It also prohibits the use of a rifle, revolver or pistol on migratory birds; restores a uniform open season in all parts of the state, and restores state supervision over the possession and sale of migratory waterfowl.

Chapter 40, to protect the shad in Palmer's River along the same lines as by the Rhode Island law.

The recommendations made to the General Court of 1924 will be found in the Appendix.

## EDUCATION AND PUBLICITY.

The usual educational and publicity work was pursued by the law enforcement organization, and consisted principally of illustrated lectures depicting various phases of fish and game propagation and the problems of law enforcement and conservation. The increased demand for these lectures from year to year from sportsmen's organizations, fraternities and school authorities indicates a wholesome interest in the cause.

The customary exhibit of live fish was put on in the divisional quarters at the State Building at the Eastern States Exposition grounds at Springfield and proved a source of great interest. No other exhibition work was attempted.

Timely articles were contributed to the press, acquainting the public with changes in the laws, fishing and hunting seasons, and giving other information concerning the work of the division and general conditions throughout the State.



## BIOLOGICAL DEPARTMENT.

On the resignation of Dr. David L. Belding on March 1, Mr. J. Arthur Kitson succeeded him as biologist.

The greater portion of the year's work was concentrated on the problems connected with the stocking of the covers and waters, which is being recognized more and more as a biological problem. (See "Fish and Game Distribution"). In addition, autopsies and routine pathological examinations were made of waterfowl killed through contact with oil, diseased birds, fish and shellfish. Outbreaks of disease, or unusual conditions at the hatcheries, were studied and treated. Data was collected on the shellfish fisheries (more fully set forth under "Mollusk Fisheries"); stream surveys were made in connection with the distribution of fish. The work of restoring the alewife fisheries was carried forward by the installation of additional fishways and by plantings of mature alewives (for details of which, see "Fishways" and "Alewife").

## WILD BIRDS AND ANIMALS.

### WINTER FEEDING.

Field conditions in the winter of 1922-3 were very unfavorable for wild life. The winter, even into March, was a succession of storms and northeast gales of snow, rain, sleet, wind and low temperatures. The snow accumulated to great depths, effectually locking away the food and gravel from the ground-feeding birds. All agencies interested in wild life united in a determined effort to help the birds through by supplying emergency rations during the worst periods. Contributions of money from individuals amounted to \$51 and were expended in addition to the \$600 from State funds. Many of the associations and workers financed their own work. While there must inevitably have been a large loss of bird life, yet spring showed good numbers of breeders, in excellent condition. No serious situation arose for the sea fowl. Wardens put out feed around the fresh-water holes, and no unusual winter mortality was noted.

### BREEDING SEASON.

Conditions in the breeding season were very favorable for a good production, the weather being good, not excessively cold, and no prolonged rains or damp periods, and few woods fires. By reason of the dry summer weather an unusual percentage of the young reached maturity.

### FIRES.

The loss to wild life on account of woods fires must have been far less than last year, for (with the exception of two large fires) the acreage thus burned over in the breeding season was far behind the record of last year. Advantage is taken of every opportunity to remind hunters and fishermen of the obligation to use care with respect to fires, and that fires are a direct menace to their sport. Certain clubs do this by post-card reminders to their members and local sportsmen. The summer-long drought made necessary the closing of the hunting season, as set forth elsewhere.

### POSTED LAND.

It is never possible at any time to give a complete survey of what is actually taking place in the attitude of the land owners. It may frequently be noticed that in a given county in a particular year there will be a large amount of posted land, with a much more liberal attitude the year following. There is very easy to discern, however, a steady absorption by individuals and clubs of the desirable hunting and fishing grounds. For example, we had the spectacle this year of the president of a fish and game association informing us that it would be useless to ship brook trout to his club this year, because every trout stream of any value within the section represented by the club had been posted against fishing.

## MIGRATORY BIRDS.

*Song and Insectivorous Birds.*

Permits were issued to 68 persons for the collection of birds, eggs and nests for scientific purposes, sixty-six reports were made, showing 267 birds and 681 eggs had been taken. To persons acting for the Biological Survey in determining facts concerning bird migration, 246 bird banding permits were issued. (See Law Enforcement for protective work.)

Every year we are compelled to disappoint certain individuals who desire to make collections of birds and eggs for private use. Our aim is to issue permits only in those cases where the cause of science will be tangibly advanced, or young students encouraged to train for scientific research as a profession.

*Migratory Game Birds.*

*Shore Birds.* — There was nothing extraordinary about the spring movement of shore birds. The continued dry, fair weather through the late summer and fall caused a "spotty" migration. The usual numbers of birds were found in favorable localities at the opening of the season. These were practically all taken by the gunners within the first day or two, and from that time on there was only scattering shooting. It was later than usual when birds were seen in numbers, especially winter yellow legs and black-breasted plover.

*Plover.* — The spring migration of black-breasted plover was heavy on the north shore, where there was a large flight in May, also heavy locally on Cape Cod; elsewhere in the State, about as usual. Upland plover showed decidedly increased numbers, and there were at least as many killdeer and piping plover as last year, with local increases.

*Snipe.* — A scattering flight of Jack or Wilson snipe appeared in the spring in no more than ordinary numbers, and smaller in spots. Of the red-breasted snipe there was only a scattering along the southeast coast. In the fall, because of the excessively dry season, most of the snipe grounds were too dry to attract and hold the birds, resulting in but little shooting. In a few favored places, and rather late in the season, some birds were killed.

*Woodcock.* — The spring flight was well distributed over the entire State, and heavier than has been noted for several years. One reason for this may have been the rather favorable weather conditions in Massachusetts and the backward conditions further north, which tended to slow up the birds on their migration after striking this region. Eventually the most birds moved northward, though more bred here than usually is the case.

The fall flight was difficult to judge, for the country was so dry that in many regions the condition of soil and cover was very much changed. The flight was less clearly defined and fewer birds were shot than usual, but it is believed that the birds changed their locations to such an extent that many flight birds were overlooked. As a whole the movement was considerably later than usual. The indications are that the woodcock is at least holding its own, if not increasing.

*Rail.* — Good numbers of rail appeared on the spring flight. The dry conditions of the late summer and fall caused the birds to move off earlier than usual.

*Sandpipers.* — The spring and fall migrations of sandpipers showed no marked or unusual features. The numerical gain since Federal protection was given, is maintained.

*Winter and Summer Yellow Legs.* — Large numbers of both winter and summer yellow legs were observed on the northward migration, at the usual time, in a steady flight. A large flight of both appeared on the north shore May 17.

On the opening of the shooting season August 16 there was good shooting in many places, with the usual number of winter yellow legs mixed in with the summer yellow legs. At some localities, such as points on the north shore, the numbers were disappointing. Later in the season winter yellow legs showed in good numbers, but scattering, with few bag limits taken at any particular time.

*Hudsonian Curlew.* — Of the larger birds the curlew appears to be the only one holding its own, and perhaps slightly increasing in numbers. This is observed in both the spring and fall flights.



*Wildfowl.* — Since the abolishment of spring shooting, and the closing of all seasons the first of January, more and more birds are wintering in the coastal waters, especially whenever the winter is reasonably open. Despite the hard winter, large numbers of geese, red-heads, blue-bills and some canvasbacks wintered, especially in the region of Vineyard and Nantucket Sounds.

The spring migration had no unusual features.

The fall migration was very unsatisfactory; but few geese were killed. The pond fowl, — the term commonly used to designate blue-bills, red-heads, canvasback, widgeon and whistlers, — were present in fewer numbers and did not decoy as readily as usual.

*Ducks.* — The usual number of black ducks was reported during the spring and breeding season. For a short time after the opening of the shooting season they were quite plentiful in some localities, especially on the south shore and the outlying islands. There was less shooting on the north shore than for a couple of years. Reports indicate that in some localities there was an abundance of birds, but the kills at even the best equipped shooting stands were not up to the past records. Owing to the mildness of the season but few of the large northern ducks appeared prior to November 30.

The wood duck is increasing, and more reported than for a number of years.

The mallard duck is only an occasional visitor, and not an important factor in the shooting of this region.

The spring flight of red-heads was heavier than usual, but during the early part of the open season comparatively few had arrived.

The canvasbacks, which are also a minor consideration, were unexpectedly observed in small numbers in some of the inland ponds, with but few along the shore.

The spring flight of blue bills was rather heavier than ordinary, but up to the time of the closing of this report had not appeared on the fall flight in usual numbers. They were wary, did not decoy well, and the shooting was not up to expectations.

The spring migration of the scoters was normal, but the fall migration did not materialize in many localities. Though large flocks were observed going down outside, the shooting was ordinary.

*Geese.* — In spite of the small numbers of geese that were seen on the 1922 fall migration, the spring movement following showed no serious diminution. It seemed to be about an average year, with no marked increase or decrease over recent years, and on the whole, steady. According to reports from fishermen off Nantucket many flocks passed out to sea.

The fall flight was disappointingly small up to November 30. Why the geese failed to appear was a mystery to the oldest gunners. No large movements at any time were reported.

*Brant.* — There was an unusually large number of brant, locally estimated at a thousand, around Nantucket in the spring, and they remained until about the 25th of June. The fall flight opened with the appearance of a good-sized bunch around October 20. Many flocks passed by without stopping — young birds first and large ones later, not so numerous as last year, but still good numbers.

*Statistics of the Gunning Stands.* — Number of stands operated, 115; geese shot, 3,672; ducks shot, 9,930; live goose decoys, 3,854; wooden goose decoys, 3,751; live duck decoys, 5,412; wooden duck decoys, 3,509.

#### *Migratory non-game Birds — Gulls and Terns.*

No warden protection was given the breeding terns this year. The gulls and terns are so widely scattered along the coast that a larger force than we could finance would be required to give them complete protection. For some years past we have stationed a special temporary warden on the larger colonies in breeding time to reduce the vermin and prevent disturbance by man. Our activity over a period of years has spread the knowledge that these birds are protected, and in spite of the adverse circumstances with which the terns and gulls — as all other wild life — must contend, they are maintaining themselves reasonably well. A close watch of the situation will be continued, and protection resumed in any colonies where it appears imperative.



*Federal Control of Migratory Birds.*

At the beginning of the period of this report the Public Shooting Ground-Game Refuge Bill, representing the second great step in the protection of migratory birds through the federal government, was still in Congress. Early in December of 1922 it passed the Senate with every prospect of passage in the House, but parliamentary tactics from organized opposition which existed through misunderstanding of the provisions of the bill, defeated it by a narrow margin. A new draft of the bill has been prepared to be introduced in December of 1923.

## UPLAND GAME.

*The Hunting Season.*

Throughout the summer there had been practically no rain, and by mid-October the woods were dry, the ground parched to a great depth, and the surface of the ground like tinder; swamps were dry or nearly so, and the fire peril a serious one. Conditions being as they were, His Excellency the Governor, under authority conferred on him by sections 29-31, Chapter 131, General Laws, suspended the season for the hunting of all kinds of game and animals from sunset of Oct. 19 until further notice. This was made public Oct. 16, that the sportsmen might have advance notice. On the 18th, 19th and 20th came rain sufficient to remove all danger, and a second proclamation lifted the ban at noon on the 20th and extended the open season on upland birds until noon on November 21. Though the season had been closed in other years, this is the first time it has been lawful (by the amendment of 1922) to restore the lost days.

*Pheasants.*—Though the winter was severe the pheasants which had survived the open season came through with no great loss, and spring found a good stock of breeders in nearly all sections. A scarcity of cocks was noted in some places, and there were reports of large flocks of hen pheasants, from 5 to 20, with only one or at most two male birds. This led in some cases to infertile eggs and poor production. This, too, may account for some of the reports of small and late broods. But on the whole a good production was indicated, and it was common to hear of numerous broods of young of good average size. Throughout the open season field conditions were very favorable for hunting, and the total number of pheasants reported killed was 2,283, divided as to county as follows: Barnstable, 14; Berkshire, 38; Bristol, 144; Essex, 303; Franklin, 79; Hampden, 170; Hampshire, 192; Middlesex, 476; Nantucket, 52; Norfolk, 196; Plymouth, 142; Suffolk, 3; Worcester, 470; locality not reported, 4.

*Ruffed Grouse.*—More grouse were left over at the close of the 1922 open season than for many years, and the winter-loss was slight in spite of the deep snows and hard weather. Spring found the covers well stocked with breeders, apparently strong and virile; weather conditions were excellent, excepting in a few localities, and even in those cases no great losses resulted, and reports were general in the summer, of large broods of well-grown young. The dry weather of the summer was favorable to their growth, and at the opening of the hunting season grouse were more numerous all over the range than had been the case for a good many years. Large coveys were the rule, and the young well grown and hardly distinguishable from the older birds. Owing to the summer drought the grouse worked into the swamps to quite an extent.

The gunning season opened with several rainy days and foliage still heavy on the trees over most of the State. While there was a liberal supply of birds in the covers, the unusual weather conditions had caused them to scatter more evenly over the country than is generally the case; so that, while good sport was afforded, it was unusual to move large numbers of birds in any one day.

*Quail.*—In the counties closed to quail shooting (Dukes, Essex, Hampden, Hampshire, Middlesex, Nantucket, Norfolk and Worcester) the situation is unchanged (with one exception) and the quail continues to be very scarce—scattered small flocks, or pairs. It is noticeable that the stock in these counties produces very few young, and they make little or no gain. The exception is Dukes County, which is steadily becoming repopulated with quail. There the winter-

kill was practically nothing, and large broods were seen, though the breeding season had been damp and foggy. In June, calls could be heard in all directions, and the quail were reported as very numerous.

In the limited section of the State where the quail thrive, it was a good year. The winter of 1922-3, though marked by severe weather and heavy snows, was not accompanied by any unusual loss of quail stock, owing to the absence of crust, and spring found them uniformly plentiful over the whole present range as well as in sections from which they had disappeared. The flocks were of good size and the birds in good condition, and with the favorable weather conditions there was an excellent production. The summer was dry and favorable to their growth, and when the gunning season opened the covers contained good numbers of well-grown birds. The quail ran true to form this year, taking long flights when disturbed and affording limited gunning at the best. The cleverness of this bird in eluding the gunner makes it certain that it will never, with our short season and limited bag, be exterminated by the gun. Severe winters and vermin are the greatest agencies of destruction.

*Deer.* — The figures for the open season on deer coming within the period of this report (Dec. 4-9, 1922) were: 1,581 deer killed, (922 bucks and 659 does), 449 in excess of the previous year, and the largest kill since 1913. They were divided as to county as follows:

Barnstable, 66; Berkshire, 284; Bristol, 47; Essex, 22; Franklin, 318; Hampden, 183; Hampshire, 179; Middlesex, 44; Norfolk, 11; Plymouth, 91; Worcester, 334; locality not given, 2. Over the greater part of the State the deer season opened with clear, cold weather and bare ground. On the second day a light fall of snow was favorable to the hunters, followed by bitter cold, high wind and rain, with clear weather the end of the week, though a crust formed which made noisy hunting and kept the deer on the move. The number of hunters was unusually large; the season was free from accidents; the laws were well observed (including the enactment of 1922 prohibiting dogs in the field during the deer week) and few crippled deer were reported after the season.

Notwithstanding the large number shot and the unusually large number (mostly does with fawn) run down and killed by dogs in the deep drifts of the winter of 1922-3, deer were present in at least usual numbers, some sections reporting a distinct increase, deer in new localities, and unusual numbers of fawns. Deer shot while damaging crops numbered 109; and towns were reimbursed by the commonwealth for claims paid for damage by deer to the amount of \$5,811.65.

*Moose.* — Moose have not made themselves conspicuous in any way during the year. They are not increasing noticeably, though a few calves are known to have been born. They are seen from time to time, but there were no complaints of damage, and no compensation claimed.

*Squirrels.* — It is difficult to know what is taking place among the gray squirrels. Reports vary widely. It is reasonable to suppose, however, that they have been driven from the chestnut woods by the death of their host trees and have taken to the scrub oak sections and to scattered clumps of hickory along the roadsides and in the open. In their search for food they are venturing more and more into orchards and residential sections. Thus they are more commonly seen, and probably the reported increases are more apparent than real.

*Hares and Rabbits.* — Over a large part of the State the native rabbits have maintained their numbers well. In northeastern Massachusetts, however, and in the west-central section a scarcity was noted. It is gratifying to have reported a good breeding season for white hares in some localities.

*Fur-bearing Animals.* — Chapter 185, Acts of 1923 provided that reports should be made to this Division of fur-bearing animals trapped or killed, from which value or profit is obtained. The returns for 1923 show: Number of reports, 644; muskrat, 9,128; mink, 983; skunk, 3,334; fox, 1,200; raccoon, 655; squirrel, 94; weasel, 109; otter, 18; total, 15,521.

It is apparent that the fur-bearing animals have not re-established themselves after the excessive trapping during the period of high prices a few years ago. There are large areas in the State which, if properly protected and conserva-



tively trapped, should yield substantial returns in fur, and we believe a close season for a year or two on muskrats would be very beneficial. There are some localities where the muskrat must be eliminated or reduced to small numbers, particularly on the Cape, where large dikes on cranberry bogs are maintained. But it is safe to say that additional protection for a couple of years would do much to build up an asset of value without corresponding injury to other wild life.

Up to the present time public sentiment has refused to give the fox protection during the breeding season. Despite this lack, it is increasing. It is to be regretted that the number of fox hunters in the State is not larger, especially those who own and hunt their own dogs. We have always emphasized the economic value of the fox, while at the same time admitting the destructiveness of certain individuals. If it were hunted and trapped more it would afford some of the finest sport to be had in the field, and a large fox-hunting fraternity might be one of the best guarantees to the public that the species would be kept within reasonable numbers if given the same protection extended to other furbearers.

#### ENEMIES TO GAME.

Starlings continue to increase and are seen in large flocks. In some sections they appear to do little harm; but in others complaints are heard of damage in the grain fields. In towns and cities they are replacing the robins. The increase is unchecked, as there is no incentive for gunners to spend ammunition on them.

Bounties of \$5 each were paid on 52 wild cat, Canada lynx or loupcervier under Section 90, Chapter 131, General Laws. They are increasing throughout all New England, and already presenting a great problem with respect to white hares and deer. They are difficult to hunt and trap, and doubtless before long it will be necessary to offer a bounty sufficiently large to insure their systematic reduction.

The hunting house cat still continues to be one of the greatest destructive factors to wild life, and the number is steadily increasing.

There has been no appreciable increase of any species of the hawks or owls classed as vermin.

There was some agitation from certain quarters over alleged destruction of trout by black-crowned night herons and great blue herons at hatcheries and along trout streams, and the large herons are charged with the destruction of large numbers of fingerlings when the brooks are low. The issuance of Federal permits to shoot them, where necessary, was suggested as a remedy. It is true that they are present in large numbers where fish are to be found, and there is plenty of evidence that they do feed on trout; yet it is still unproved whether their main food is trout, or whether they feed also on minnows, herring and less valuable species, for no systematic investigations have been conducted to determine the facts. Plans are being made with the Biological Survey for a study of the stomach contents of some of these herons.

#### RESERVATIONS.

##### *Martha's Vineyard Reservation.*

The expiration of the lease of the portion of the reservation which the commonwealth does not own brought up the question of its renewal. In this connection it seemed advisable to pause and consider the status of the heath hen, both as to what had been accomplished in the past, and what appeared to be its future. In surveying the situation the following facts appeared —

The heath hen had been given special protection by the State since 1907. A sanctuary of 1,864 acres (564 State-owned and 1,300 leased) had been maintained, located on and around the area chosen by the heath hen as their last stand. It included both the typical scrub oak country of Marthas Vineyard and extensive areas of grassland, and sufficient land was cultivated each year to provide standing feed for the birds in winter and green food at other seasons. A resident caretaker was in charge who carefully patrolled the reservation against vermin, and illegal shooting was practically nil. In short, the aim had



been to maintain conditions that would be as nearly ideal for the heath hen as possible. Varying sums, running as high as \$5,000 in 1914 and thereafter an average of about \$4,000 yearly, had been expended by the State, totalling up to the beginning of 1923, \$48,185.54.

What had been the result of this 15 years of care? When the reservation was started in 1907 it was estimated that there were from 75 to 100 heath hens left on the island. Since that time they had increased with wide fluctuations. Estimates of their numbers had run, in some years, as high as 2,000. For a period of years following a very destructive forest fire in 1916 they had gradually increased and then decreased, until in January, 1923, at the time of this review, it was estimated that there were not more than 150 heath hens on the island. (This estimate, however, was too high, as proved by the spring census a couple of months later). This despite the fact that in recent years there had been no disastrous fires or excessive visitations of vermin, and conditions had been maintained on the reservation as above. During the last few years, since the birds had become scarce, yearly counts have been made either by the State Ornithologist or our agents, each spring, by visiting the known haunts of the birds and counting the number of individuals in sight when they are in the open for their mating antics. While such a census is by no means complete, it gives a basis for estimate. In 1917 the count was 126; in 1918, 155; in 1919, 165; in 1920, no census, as bad weather kept the birds under cover; in 1921, 314; in 1922, 117; and through the winter of 1922-3 they had been unusually scarce.

With the above facts before them, the fish and game officials were obliged to face the question whether the citizens of the commonwealth, whose interests they represent and whose money they disburse, would consider it justifiable to continue to invest several thousand dollars yearly of the public funds in what was apparently a losing cause, when the same amount, used in other ways, would stock the island with other varieties of game, from which perhaps a greater portion of the tax-paying public would derive benefit and pleasure. In order to guard against the introduction of disease among the heath hen no game birds (except quail) had been liberated on the island since the establishment of the reservation.

Following the established policy of taking the public into our confidence and asking advice and suggestions when crises of this sort arise, a statement of facts was prepared, and a questionnaire, setting forth a number of possible courses. These were sent to about 100 persons, including the original subscribers to the heath hen fund, the local town governments, sportsmen, conservationists, the State ornithologist, the State and National Audubon Societies, the American Ornithologists' Union, as well as some of the foremost ornithologists of the entire country. The propositions submitted to them were:—

1. Shall the lease of the Cromwell property be discontinued and that portion of the reservation given up?
2. Shall the State-owned land of 564 acres be continued as a heath hen reservation as in the past, with the addition of a limited amount of pheasant breeding for stocking Martha's Vineyard and Nantucket?
3. Or, shall the protection of the heath hen be abandoned and the island stocked with quail and pheasants to provide upland game shooting, so far as unposted land will permit? (This being done after specimens of the heath hen have been prepared and deposited in museums to preserve them for science).
4. Or, shall we do all possible to keep the reservation as attractive as possible for the heath hen, to preserve them as long as possible?
5. Would you advise a general conference to be held at the State House, to discuss these questions?

Sixty-five replies were received, 49 favoring continued protection and 16 taking the contrary view.

Various suggestions were received, but practically all were already in operation. The proposal for an intensive biological study of the heath hen could not be adopted for financial reasons, but Dr. John C. Phillips of Wenham and

others came forward with an offer to finance such a study. Prof. Alfred O. Gross of Bowdoin College, Brunswick, Me., was selected and went to the island in April, spending much time on the ground during the spring and summer and returning at intervals during the remainder of the year. His report will not be made until a full year's observations have been recorded, and the future policy of the Division will be determined to some extent by his findings and recommendations. Meantime, with sentiment so overwhelmingly in favor of protection, the lease was renewed for another year, the reservation continued as in the past, and all interested persons so notified.

Following is the reservation report for the year:

The usual patrol work and the hunting of vermin occupied the winter months. The unusually severe winter which prevailed over the State did not extend to Martha's Vineyard, and feeding of quail and heath hen was necessary on only a few occasions. Spring work, consisting of the planting of crops for birds and live stock, along with the repairing of roads, progressed as usual.

The spring census of 1923 gave 46 birds on May 3 by actual count.

The weather conditions in the breeding season were very good. The superintendent saw 2 broods of heath hen and heard of another, 11 chicks all told. Though a careful watch was kept during the time the birds were in the open, very few females were observed and the inference is that the greater proportion of the surviving birds are males. But 5 heath hens have been seen on the reservation since early summer to the time of this report, and reports from farmers and others on bordering farms account for about 30 more.

Very many visitors called at the reservation during the spring and summer as a direct result of the publicity given by the press to the investigation in progress. No fires occurred to affect the heath hen. The total kill of vermin was 15 wood cats, 211 rats, and 8 hawks.

#### *Myles Standish State Forest.*

Good progress was made in improving the condition of the roads and fire-stops. Wild life is increasing in spite of the constant struggle which must be maintained against vermin, and deer are becoming a serious menace to the young trees.

There were 150 pheasants raised, 100 of which were liberated on the reservation. The forest has been patrolled when it appeared necessary and in connection with other work. There were no violations of law.

#### *Sharon Reservation — Moose Hill Bird Sanctuary.*

The conduct of the reservation proceeded on usual lines. Through the continued co-operation of nearby owners over 600 acres of land, including two ponds suitable for wild fowl, have, during the past year, been added to the protected area which is now more than 1,500 acres. This land is thoroughly posted and patrolled, and a general observance of the game laws has been evident.

The value of the co-ordinating work of the Massachusetts Audubon Society in the ownership and maintenance of the Moose Hill Bird Sanctuary near the center of this area can hardly be over-estimated. The improvements in the new headquarters; the making of new trails about the grounds; the valuable exhibits and library of information here maintained, and the setting out of shrubs and trees to attract and shelter the birds, — as well as the efforts to re-establish and protect vanishing wild flowers, — all are part of a general plan which is being carried out for a permanent sanctuary for all wild life. Through continued daily feeding many birds are in evidence about the sanctuary grounds throughout the year, thus rendering the opportunities for study and observation more and more valuable as the years go by. The public is showing a constantly increasing appreciation of these benefits, — evidenced by the increasing numbers of intelligent, interested visitors, totalling during the past year about 5,000. Banding of birds was carried on as usual for the U. S. Biological Survey.



*Reservation under Sections 69-75, Ch. 131, Gen. Laws.*

Within the period of this report the terms for which the following reservations were made, expired, and no petitions were received for renewal: Pittsfield Reservation expired Jan. 16; Hubbardston Reservation, Apr. 14; and Seconticut Neck Reservation Fairhaven, Nov. 6.

A new reservation, known as the Harvard Forest Reservation, was established in Petersham for 5 years from Feb. 15, 1923. This land, about 700 acres, is owned by Harvard College and has been set aside as a preserve because of the wonderful variation in its woodlands, its sightly locations and the unspoiled natural conditions. In order that the wild life in this forest may be likewise preserved it has been placed under the protection of this Division.

To the reservation in Boxford was added, by gift of Dr. John C. Phillips of Wenham who deeded the land to the Commonwealth last year, an additional 3 acres which makes it a solid tract.

**INLAND FISHERIES.****GENERAL.**

This year marks an epoch in the history of our inland fisheries, for the prohibition of the sale of fresh-water fish taken in Massachusetts puts an end to the commercialization of our fresh-water fisheries, in the same way that in 1912 the sale of game killed in the State was stopped. The already existing protective measures (length, bag and seasonal limits) were improved by the placing of a closed season and catch limit on pike perch; closed season on horned pout and yellow perch; length limit for rainbow and brown trout; making permanent the 12-inch limit on pickerel; and changing the catch limit for white perch from a weight to a numerical basis. Now, for the first time, Massachusetts can claim a code of laws which gives at least a reasonable protection to its greatly abused fisheries. It will be many years before the rehabilitation of the fisheries is accomplished, but with the incentive to fish for market removed and with both natural and artificial stocking proceeding, the outlook for the future is more promising than could be said before.

**TROUT.**

In the section extending from the coast westward through Worcester County the early season for trout fishing was, on the whole, disappointing, being very dry, with low water and small catches. Essex County escaped the drought, water and weather conditions being favorable and fishing good. In the west-central, hilly section the season fell below standard, for the cold weather early in the season and the low water at the end, was unfavorable to the fishermen. The Berkshire section fared best. Though the season opened late on account of a very cold spring, with high water and low temperature, as the weather warmed up fishing improved and the trout ran well as to size. In summer all over the state streams became very low and many dried up early in June, but heavy rains improved conditions somewhat by August, after which again extreme dryness prevailed until October, drying up the smaller streams completely and bringing the larger ones very low.

Concerning brown trout there is nothing new to report. The usual number of good catches were made. We are continuing the effort to build up a brood stock of brown trout at the Palmer Hatchery, but as practically all the hatch of 1922 was lost, progress is slow at present. (See "Fish and Game Distribution"). Legislation this year set the legal length of brown trout at eight inches.

**CHINOOK SALMON.**

So far as could be learned no Chinook salmon were taken in either Long Pond, Plymouth, Cliff Pond, Brewster or Peters Pond, Sandwich. In Long Pond the white perch, bass and smelt which were previously numerous have also disappeared. This is laid by popular belief to the salmon. The question is before us what line to follow in the future development of this pond. On the one hand, a certain element urges the introduction of salmon fingerlings each year to



produce the 1 to 2-lb. fish that have afforded them good sport in fishing with a light fly rod and live shrimp. Land owners around the pond, on the other hand, oppose the salmon as detrimental to bass and white perch and favor the restoration of the latter fisheries.

#### PIKE PERCH.

The pike perch has proved to be, like the Chinook salmon, one of those species which has established itself in only a very small percentage of the waters into which introduced. Though many apparently favorable ponds were liberally stocked with fry over a period of ten years, it has been almost without result. A review of the fishing season of 1923 shows that good catches were made in Massapoag Lake, Sharon, which is about the only pond successfully stocked. This has consistently yielded good catches for a number of years, and fishermen frequently return more than their catch limit to the waters. In some waters which have yielded fair catches the fishing has fallen off to practically no catch. In the Connecticut River pike perch were taken only occasionally. In the Deerfield River fishing was not as good as some years. Our recommendation in 1922 for protection was adopted, and the catch limit of 5 in one day, 12-inch length limit, and closed season from February 1 to April 30 should permit a better natural increase. No plantings of pike perch were made in 1923, this expensive work being discontinued, at least for the present.

#### PICKEREL AND PIKE.

Though large pickerel are still taken quite commonly in the State, it occurs in particular places and is not the prevailing condition. Many sections are reporting that the pickerel are running small in size and decreasing in numbers. This is not surprising and is the natural result of a long period of excessive fishing, particularly winter fishing, with no replacement by artificial propagation. We can only renew our statement of previous years, that until some restriction is placed on the amount of winter fishing, the pickerel fishing in our ponds will continue to decline. The summer drought, which brought the ponds and brooks unusually low, doubtless worked much harm for it made possible the taking of quantities of the large breeders. In some places fish were stranded and died by reason of the drying up of the rivers and ponds. The Connecticut River and the Oxbow at Mt. Tom yielded good catches of pike, several being taken weighing in the neighborhood of 15 pounds.

#### BASS.

There were no unusual features to the bass season this year. Certain waters yield good catches. There appears to be an increasing demand for large mouth bass. It is not possible to propagate these by the usual hatchery methods, but we hope to produce them by the brood-pond method, now being developed, and by capture of fry in such places as water supply ponds. It is our aim and object to develop bass fishing in suitable ponds as fast as circumstances permit.

#### WHITE PERCH.

The stocking of the ponds of the State with white perch is continuing from year to year as a routine matter, and that it is not fruitless is proved by the fact that each year they begin to appear in a few of the ponds in which stock has been planted. For account of the salvage work, see "Fish and Game Distribution."

#### SMELT.

Smelt work was limited to patrol of the only remaining spawning grounds of any importance on our coast, the Mill River and the Parker River on the North Shore, and the streams around Weymouth on the South Shore.

The run in all the coastal streams was very poor, even in the Weir River, Hingham, and in the Weymouth Fore and Back Rivers, Weymouth. It was difficult to find any spawn except in the Weir River, and there, being deposited on flood water, much went to waste. In the Mill River and in the Parker River,

there were heavy runs and deposits of spawn for a few nights, and it is probable that there was a fair hatch.

At Laurel Lake, Lee, and Onota Lake, Pittsfield, many people were on hand to secure the allotment of fresh-water smelt permitted under the Division's regulations, but the smelt were scarce. This reduction in numbers is in accord with the wishes of the local fishermen, who believe the lakes are over-supplied with bait fish.

#### HORNED POUT AND CATFISH.

Field reports show that, while certain favorable waters yielded the usual good catches, for the State as a whole it is indisputably true that the horned pout are running small in size and fewer in numbers. The drying off of small, isolated ponds during the protracted drought resulted in heavy losses to the fish life and permitted an undue amount of adult stock to be taken, the effect of which will be apparent in the future. Several years ago we started to build up the stocks in the State, but the ponds are so many and our resources so small, that results cannot be expected for some years. The provision made by the last Legislature for a catch limit on horned pout of 40 in one day, and a closed season from March 1 to June 14, should in time help along the rehabilitation of the species.

It is too soon to expect very definite results from the planting of catfish in 1920 and 1922, though a few are beginning to show in the Connecticut River and one of the stocked ponds. A number of the catfish were caught out shortly after being planted, and before they had had a chance to breed.

#### BLUEGILL, CALICO BASS, LONG-EARED SUNFISH.

Bluegill sunfish for distribution were taken in salvage from General Butler Ames' Pond in Tewksbury and from the Stockwell Pond unit, and a limited number of Calico Bass and Long-eared sunfish from the former. It will be some years, however, before results of plantings will appear.

#### ICE FISHING.

Ice fishing was carried on to a less extent than for many winters. The season opened well with fair catches up to about the first of January. From that time on there was continuous cold weather, and heavy ice formed, making it difficult to cut holes, and the deep snow, which held all through the winter, made travel difficult and the ponds practically inaccessible. While it is possible that a very severe winter may automatically provide a closed season, in some sections of the state this is not true, especially in the eastern and the Cape Cod districts. The situation should not be left to chance, but some limitation should be made in the period of winter fishing.

#### PONDS.

##### *Public Rights.*

There is a growing demand by the public for rights of way to the great ponds, and the question arises every year with reference to some particular pond. The matter will never be settled until there is further legislation, but as bearing on it the Attorney General recently handed down an opinion, of which his summary of conclusions follows:—

1. Great ponds are ponds created by the natural formation of the land at a particular place, containing, in their natural condition, more than ten acres.

2. Title to great ponds which had not before the year 1647 been granted to a town or been appropriated to private persons is in the Commonwealth for the benefit of the public.

3. Public rights in great ponds which are not appropriated to private persons are not limited to those mentioned in the Colonial Ordinances. Such ponds are devoted to such public uses as the progress of civilization and the increasing wants of the community properly demand.

4. The public rights are common to all persons.

5. Except during the period from 1835 to 1867 prescriptive rights in great ponds could not be acquired against the Commonwealth.



6. The Commonwealth and the public may acquire prescriptive rights in ponds which are privately owned.

7. The control of great ponds is in the Legislature, which may regulate and change the public rights or take them away altogether.

8. There is now no public right to fish in ponds containing twenty acres or less where such ponds are entirely surrounded by land of private riparian owners, or where the surrounding land is owned by private persons and the Commonwealth or a county, city or town, and compensation has been paid by the private owners in accordance with the statutory provisions.

9. The other public rights in great ponds, whether more or less than twenty acres in area, are not affected by the statute relative to fishing and exist in full force, except as they have otherwise been restricted by the Legislature.

10. In ponds containing more than twenty acres in area, the public, in addition to such rights as it had in the pond itself, has a right to reasonable means of access to such ponds for the purpose of fishing.

11. In exercising the foregoing right the public may, where there are no means of access over unimproved and unenclosed land and no public lands or public roads or rights of way, pass in a reasonable manner over other lands of proprietors bordering on such ponds.

12. The public, in order to gain access to great ponds for the purpose of exercising the right of fowling, and possibly some other rights which reasonably may be supposed to have been contemplated at the time of the adoption of the Colonial Ordinance may, where there are no public lands, public roads or rights of way, pass and repass on foot over unimproved and unenclosed lands without rendering themselves liable as trespassers.

#### *Ponds Stocked and Closed.*

The following ponds were stocked under Section 28, Chapter 130, General Laws, and closed to winter fishing by regulations which in all cases expire November 1, 1926: Warner Pond, Greenwich; Curtis Pond, Greenwich; Winnecunnet Pond, Norton; Little Alum Pond, Brimfield; Fort Pond, Littleton. The regulations close the ponds to all fishing except between May 30 and October 31, inclusive, of each year, and the tributary streams are closed except between April 15 and July 31, inclusive. Fishing is allowed only with a hand line and single hook, or with a single hook and line attached to a rod or pole held in the hand.

#### *Privately-owned Ponds Stocked.*

The following privately-owned ponds were stocked with food fish on stipulation of the riparian proprietors that they will permit public fishing therein for a specified term of years: Neponset Reservoir, public fishing permitted to December 19, 1932, except from Dec. 1 to Apr. 30 of each year; Bartlett's Pond, Leominster, fishing permitted to May 25, 1933; Carver's Pond, Bridgewater, fishing permitted to May 25, 1933.

The following privately-owned ponds were stocked on written agreement by the owners to permit the Division in future to take an equal amount of stock from the resulting increase: Pond of John S. Lawrence, Topsfield, black bass; Pond of Herbert R. Wolcott, Springfield, horned pout.

#### FISHWAYS.

The opening up of the alewife streams by the installation of fishways is proceeding year by year, as fast as other activities will permit, and will continue until all the principal streams are open from headwaters to sea. The object is to produce in our coastal waters a quantity of young alewives which will provide a food supply, and thereby attract the other migratory fishes which furnish human food, and to insure passage for other species which we know use the ways. In most instances the dam owners offer their co-operation, though there are still some who are unable to appreciate the necessity of this work and the value of these fisheries.

During the run of alewives and other anadromous fish the functioning of all existing fishways was carefully observed, and during the year the preliminary



work looking to the installation of new ones was pursued. Present efforts are directed to the opening of the Ipswich, the Saugus and the Parker Rivers.

A considerable amount of experimental work was done towards inventing an automatic device for the regulation of the flow of water through the various fishways, — still in the experimental stage.

#### *Ipswich River.*

*Ipswich Mills.* — Frequent observations failed to disclose any alewives in the river at the Ipswich Mills fishway; but even if present it is doubtful if they could have surmounted this fishway, owing to the high drop between the lowest compartment and low water level (due to high water in the spring). This condition has existed since the completion of this fishway in 1921. On July 11 negotiations were re-opened with the owners, and they were asked to construct an additional compartment to the then existing fishway. They complied most willingly. The work was completed early in September according to plans furnished by this Division, and it is believed that there is now an adequate construction to pass the fish over the first obstruction on the Ipswich River, nearest the sea.

*Norwood Mills.* — Plans and specifications for a fishway were submitted early in 1922, but no action has been taken by the owners towards complying. They have indicated a willingness to co-operate to install a fishway, but not of the type recommended. Installation has not been insisted upon up to this time on account of the non-completion of the Ipswich Mills fishway. With that now in working condition it is in order to proceed with the next two obstructions.

*Willowdale Dam.* — Plans and specifications for a fishway were submitted early in 1922; but the owner objected to building it on the ground that there were obstructions below his dam, namely, at the Norwood and Ipswich Mills. This case will be taken up in its proper order as the opening of the river proceeds.

#### *Saugus River.*

*Wallace Nutting Dam.* — The plans and specifications for a fishway at the dam of this company are nearly completed.

*Prankers Pond Fishway.* — The Prankers Pond fishway has been repaired, and, while it was in working condition when examined, it does not look good for any length of service.

#### *Parker River.*

*Byfield Woolen Co.* — As a result of our action in submitting plans and specifications for a fishway to the Byfield Woolen Co., the companies representing all of the obstructions on the river have asked that a conference be arranged at which the matter of fishways on the whole system may be considered at one time.

#### *Merrimack River.*

As it is of particular interest to know what takes place in the Merrimack River (so polluted that it was predicted no fish could live in it), now that the spawning grounds have been made accessible by fishways, a special observer was on duty at each fishway during the period when anadromous fish were passing up. High water in the spring and low water in the summer curtailed the period during which the ways could be kept open.

*Lawrence Fishway.* — The fishway at Lawrence was kept open between May 9 and June 30, during which time it was recorded that the following passed through, — 3,943 alewives, 1,717 shiners, 21 carp, and 651 miscellaneous fish. The number of different species using it this season showed a decided increase over the preceding year.

*Lowell Fishway.* — At Lowell alewives first appeared on May 18, about a week earlier than last year, and ran up to June 13. At Lawrence they were first seen passing through the fishway on May 16, an interval of about 3 days before they reached the fishway at Lowell. In 1922 an interval of 9 days marked their passage up the river. Observations were made twice daily, and from May 11 to June 25 there were recorded as having passed through the fishway, 910 alewives and 166 shiners and dace.

*Paskamansett River.*

The fishway installed last year at Russells Mills, South Dartmouth, was inspected periodically, and considerable time spent in adjusting the flashboards and regulating the flow of water. A few alewives were seen in the fishway.

*Barker's River.*

Results at the fishway installed in 1922 by F. L. Snow at Pembroke justified our belief that it would prove a very practical fishway, for on May 6 there were counted 850 alewives in one hour, and on the 26th an inspection showed 25 to 40 alewives passed the head of the fishway in one minute. The bog owners in this locality, as well as the selectmen, are co-operating in every way to restore this fishery.

*Taunton, Town, Satucket and Nemasket Rivers; Red Brook, Wareham and Plymouth, and Herring River, Bournedale.*

All the fishways on these rivers were in operation; observations were made periodically, and in most instances the ways were found to be operating effectively and a variety of fish surmounting in fair numbers. We are trying to hasten the restoration of the alewife fisheries of the Taunton River system by making yearly plants of mature alewives (for account of which, see "Alewives").

*Easton Investment Co.*—This is the first year that the fishway at the old Ames dam on the Town River at West Bridgewater, completed in November, 1922, has been in operation. Periodical examinations showed it to be working very effectively, with the right amount of water passing through, and with a gradual surmounting to be made by the fish.

*Hanson Cedar Co.*—In the course of reclaiming and transforming into cranberry bogs some hundreds of acres of swamp and pond in Halifax and Hanson, a dam was constructed below Monponsett Pond, for flowage purposes. This would bar alewives from Robbins Pond (the headwaters of the Taunton River), which has recently been opened its entire length by installation of fishways. A conference between officials of the company and this division resulted in the construction of a concrete fishway consisting of a 2x2x15 ft. trough with 6-inch steps at intervals of 3 ft. When examined this spring it was functioning properly, though no fish were seen at the time.

#### POLLUTION.

Such cases of pollution of fishing waters as came to our attention were handled along with the regular routine of business.

*Shellfish in Polluted Areas.*

Areas in Boston and Cohasset Harbors polluted by sewage were closed to the taking of shellfish. (See "Mollusk Fisheries.")

*Oil Pollution.*

Through the winter of 1922-3 large numbers of water fowl perished through contact with oil. Nantucket waters were badly polluted, and numbers of dead birds picked up daily. At Nantasket the unloading of crude oil into the harbor caused the destruction of about a thousand ducks. Conditions off Chatham are pictured in a letter from the Monomoy lighthouse keeper dated January 24:

"There are fully two to three thousand eider ducks in this vicinity, and I doubt very much indeed if there will be very many, if any, left to return to their native breeding ground in the north. I rode about 3 miles up the beach, north, this morning, and it was as much as I could do to keep clear of the ducks running over the beach to the tall beach grass where they go and hide, and in the end die; for they cannot fly on account of the oil. I do not know what results would be if one undertook to walk from Chatham to this light along the beach, but I have every reason to believe that a good-sized team would be needed to put the dead and dying in. I assure you, I cannot express the condition of these birds on paper; and though I have a very good glass here, I have failed to find one duck that is clear of the oil."



The destruction which threatens our shellfisheries, shore fisheries and water fowl through pollution of coastal waters by discharges of oil from oil-burning steamers, has been discussed in other reports. State law does not reach these cases, the pollution occurring largely outside the three-mile limit. Definite remedial measures, however, are under way. In August, 1922, the National Coast Anti-Pollution League was formed under the sponsorship of the New Jersey State League of Municipalities, composed of state and municipal officials and civic representatives from the coast states and cities. That organization supported a bill in Congress, the so-called Freylinghuysen-Appleby Anti-Pollution Bill, which failed of passage by a narrow margin. A joint Congressional Resolution authorized the Secretary of State to call an international conference on oil pollution. An Interdepartmental Committee was formed to prepare necessary data, and the U. S. Bureau of Mines completed a survey of pollution on the entire coast, co-operating with the American Petroleum Institution and the American Steamship Owners' Association. To plan a further campaign a second conference was held at Atlantic City in October of 1923, attended by government officials, port authorities, chambers of commerce, and similar bodies. Though not in attendance at the meeting, the director of this division was elected to membership on the Executive Committee.

## PROPAGATION OF FISH AND GAME.

### FISH HATCHERIES AND GAME FARMS.

At three hatcheries, Sutton, Amherst and Montague, the disease appeared known as *Furunculosis* or fish septicemia, — in fingerlings only at the former, and in fingerlings and yearlings at the two latter. The disease is not likely to cause any great loss of fish at any of these stations, owing to the low temperature of the water. If past observations are to be relied upon, it will never take the epidemic form, though it is conceivable that under certain weather conditions, poor quality of fish, crowded pools, or special strains of the invading organism, an epidemic might result. The possibility is very remote, however. A thorough sterilization was made at the end of the season of all the pools in which the fish had shown evidence of the disease.

The results of the year in the production of fish and game were very satisfactory, both as to amount and quality of product, with some improvement in the point of cost. For some time we have realized that an efficient operation of fish hatcheries and game farms is not attained in the mere production of a large amount of stock, but lies in doing it at a reasonable figure. That is to say, the production costs should not be disproportionate to the market value of the output.

#### *Palmer Fish Hatchery.*

Construction and improvement work was confined to improvements and additions to trout pools, painting the tenement house, and grading.

*Small-mouth Black Bass.* — The hatching and rearing of small-mouth black bass was carried on in the usual way. Experimental work is under way (successful this year, but to be repeated before permanent adoption) to make it possible to send out fry of a larger size. There were distributed 131,000 fry (one-inch), 30,000 two-inch and 38,335 three-inch fingerlings.

*Brook Trout.* — The eggs for hatching comprised 100,000 eyed eggs from the Sandwich Hatchery, 19,000 from the wild stock at the station and 500,000 purchased. There were hatched and distributed the following — 66,400 fry to the Sutton Hatchery and 186,000 fry to the Amherst Rearing Station; 59,000 fingerlings to the Sutton Hatchery and 41,100 fingerlings to the Amherst Rearing Station, and a general distribution to public waters of 120,245 fingerlings (80,000 three-inch, 40,590 four-inch) and 12 yearlings.

*Brown Trout.* — There were 201,000 brown trout eggs purchased which yielded 194,703 fry, from which 40,225 fingerlings were reared. Losses were large as the fry would not, at first, take liver as food, and the natural food in the water was insufficient. There were 39,225 distributed as 3½-inch finger-



lings, and 1,000 held to be reared for breeders. This is the second year of rearing of brown trout fingerlings at Palmer. The New York Conservation Commission contributed 520 fingerlings which were added to the brood stock.

*Horned Pout.*—No great attention was given to rearing horned pout at Palmer. The water supply and shiner ponds yielded 44,000 fingerlings, which were distributed along with the approximately 100,000 fingerlings purchased from private sources and handled from Palmer as a distributing center (80,000 2½-inch and 64,000 4-inch).

*Blue Gills and Yellow Perch.*—Distribution was made of 3,575 blue gills (2½ inch) reared the previous year and held in the ponds over winter, and 4,000 (3½ inch) yellow perch fingerlings collected from the shiner pond.

#### *Amherst Rearing Station.*

Development work was continued throughout the year, including construction of shipping stand, permanent camp, improvement of existing ponds, construction of new ones, and re-arrangements for the better utilization of the water supply. The development work has called for only a moderate annual expenditure, but has been fruitful of results.

The opening of the station was delayed as long as possible on account of the great depth of snow, and work was started February 26 to prepare the station to receive stock. This consisted of 186,000 fry and 41,100 fingerlings from Palmer; 25,000 fry from Sandwich; 204,400 fry from Montague,—all of satisfactory quality except one shipment of about 25,000 late fry. This amount did not fill the ponds, and part of the unusual room was utilized for 1,610 yearlings shipped in from Montague. The condition and growth of the fingerling stock was good through the season, except lots infected by disease. As usual the early growth was slow, but after midsummer rapid and vigorous. This appears to be a fixed condition at this station, and in two respects adds to its value, for the fish make their growth on a food consumption that is well below the average, and at distribution are hardier than are fish in which early growth is rapid and then checked. Distributions totalled 235,000 fingerlings (180,000 three-inch, 35,000 three and a half inch, and 20,000 four-inch), and 1,000 of the yearlings received from Montague.

#### *Montague Rearing Station.*

Construction work was largely limited to permanent items, including concrete bridges, water supply for shipping, and completion of the ice house building, workshop and storage. Improvement work included some extension of facilities for feeding early fry, by digging out pools among the springs, and improving the older pools by enlarging and deepening in the clean-out work.

It was an excellent year for production. The egg-stock consisted of 1,000,000 from commercial dealers, and 100,000 from the station brood stock. The increased hatching capacity made it possible to carry enough eggs to fully supply the station, and in addition to supply 204,400 fry to Amherst. To relieve the station and use available space elsewhere, 1,610 of the yearlings were transferred to Amherst. There were sent out on general distribution 3,160 yearlings. The hatching and rearing work progressed normally, and the year's output of fingerlings was 387,500 for general distribution (258,300 three-inch, 60,000 three and a half inch, and 69,200 four-inch), and 1,000 fingerlings held for brood stock.

#### *Sandwich Fish Hatcheries.*

At the Sandwich plant repairs were made on a number of the cement ponds, and several new wells driven to replace old ones. At East Sandwich the hatchery building was enlarged, four old pools replaced, and filling and grading done.

A supply of 1,360,000 eggs was taken from the brood stock. The season was unusually successful, with no set-backs of any kind. Distributions were as follows:

Palmer Hatchery (eyed eggs), 100,000.

Sutton Hatchery (1 to  $1\frac{1}{4}$  inch), 196,000.

Amherst Rearing Station (1 to  $1\frac{1}{4}$  inch), 25,000.

Worcester Fish and Game Association (1 to  $1\frac{1}{4}$  inch), 60,000.

Canton Rearing Station (1 to  $1\frac{1}{4}$  inch), 25,000.

To public waters (250,000 three-inch, 100,000 three and a half inch, and 88,912 four-inch), 438,912.

Retained at hatchery for brood stock, 10,000.

During the season distributed to public waters (adults), 2,899.

### *Sutton Hatchery.*

At the Sutton Hatchery improvement work was carried on more or less continuously throughout the year, and at some periods was the chief occupation. It included rather extensive repairs to the buildings, painting, repairs to salvage equipment, fitting and storage of the camp to be set up at Amherst, repairs and alterations to the ponds and water supplies, and improvements to the grounds.

For rearing there were received 196,000 fry from Sandwich and 66,400 fry and 59,000 fingerlings from Palmer. Some of the earliest shipments were not of the best quality, unfit for long transportation and transfer to ponds under the very wintry conditions, and not less than 40,000 were lost directly after arrival. All other fish received were satisfactory and did well throughout the growing season. Distributions to public waters totalled 194,774 fingerlings (75,000 three inch, 75,000 three and one-half inch, and 44,774 four inch fish).

### *Marshfield Bird Farm.*

The barn on the land purchased last year was remodelled into a grain room, and mixer installed. There were no few features in the rearing work. From the adult stock of the station there were contributed 131 pheasants to form the special flock of egg-producers at Wilbraham to provide eggs for distribution. (See Fish and Game Distribution). The station brood stock of 454 pheasants produced 13,242 eggs collected and set, of which 7,869 hatched. There were reared and liberated 3,828 young pheasants (with 434 on hand at the end of the year). There were liberated 210 adults. The bulk of the distributions were made by truck.

### *Sandwich Bird Farm.*

The Sandwich Bird Farm is now conducted as a pheasant producing plant, with wood ducks and quail handled on a very small scale in continuance of breeding experiments. The work of remodelling the station was continued, completing ten 10x16-ft. brooder houses with connecting pens and hot-water brooder system. The partly constructed cement incubator cellar was usable to some extent, and has since been completed with grain and storage rooms, workshop and office above it.

*Pheasants.*—The brood stock at the beginning of the laying season numbered 381 from which 11,121 eggs were collected and set, with a hatch of 5,635 chicks. From these were raised 2,074 of which 1,722 were distributed in the covers, 152 added to the brood stock, and 200 late-hatched birds held over winter. Twenty-five of this year's early hatched cocks were purchased and added to the brood stock to change the blood lines. Before the breeding season 26 adults were distributed, and during the fall 32 more adults.

*Wood Ducks.*—Breeding birds on hand at the beginning of the season, 39; eggs collected, 133; hatched, 79; reared, 69; killed accidentally and lost, 14; distributed, 1 adult and 57 young; on hand, 8.

*Quail.*—From a stock of 32 adults about 50 young were raised with bantams; 20 distributed; 30 on hand. Three adults sent out for experimental purposes. The 22 quail that survived from the shipment from Arkansas were liberated on Martha's Vineyard.



*Wilbraham Game Farm.*

At the Wilbraham Game Farm rearing facilities were increased by the construction of five 10x20-ft. brooder houses, the replacement of temporary yards with ten permanent ones (20x48-ft.), and the addition of 3 incubators and 5 coal-heated brooders.

This station was made the headquarters for the production and distribution of the egg-stock. Towards this 176 adults were contributed. (See Fish and Game Distribution).

Brood stock numbered 450 birds, from which 18,226 eggs were collected. There were set in incubators 17,963, and 8,775 hatched. All of the usual difficulties were experienced during the rearing season, some being overcome, and others still a problem. The dry, hot weather in the time of flight of the rose chafer was responsible for more damages than usual from this source. Eggs collected during the extremely hot period resulted in some very poor hatches. From the chicks hatched 3,316 were reared to distribution age and liberated, 275 retained for brood stock, and 386 held for later distribution. Sixty adults, not part of the egg stock, were liberated at the beginning of the breeding season.

*Myles Standish State Forest Reservation.*

On the Myles Standish State Forest (see Reservations) 150 pheasants were raised, of which 100 were liberated.

## FIELD PROPAGATION.

*Pond Cultural Methods.*

Past efforts in fish culture have been concentrated chiefly on production of brook trout and the re-stocking of brooks. The need of giving similar attention to the ponds has been recognized, and it is not intended to expand the work at the trout hatcheries materially beyond its present volume. Work for the production of pond fish is already under way. Probably this can best be accomplished (as most pond fish do not respond to hatchery methods) by securing control of suitable ponds, stocking them with breeders of the desired species, and distributing the yearly increase. Following is the report of accomplishments thus far.

*Shaker Mill Pond.*—All necessary repairs and construction having been completed in 1922, no work, aside from frequent inspection, was done during the first four months of 1923. A good body of water was held throughout the winter and the fish apparently came through in excellent condition. Although the summer's unprecedented drought completely dried the inlet stream, it was possible to conserve a sufficient supply of water to sustain the fish without apparent loss, although it is very possible that the congestion, caused by the prolonged period of low water, may have led to an abnormal destruction of fry by adult fish and aquatic birds.

The brood stock in the pond was increased by 523 horned pout, 895 blue gills, 144 calico bass, 3 crappie, all adults, and 2,000 horned pout fry. A gratifying number of young blue gills began to appear in the shoal water by the latter part of August. The nature of the bottom precludes observation of results with the horned pout. The arrest and prosecution of three poachers last year has put an end to troubles from this source. No distributions were made this year.

*Stockwell Ponds.*—The close of the year finds the construction work designed to make dams, embankments and other work water-tight, well advanced so that it will require but a moderate amount of work annually for two or three years to reach the highest level possible in all the ponds. This has already been accomplished at the Putnam Mill Pond. The wheel pit was converted into a concrete-lined catching and sorting basin for convenience in handling fish, and to prevent escapes. These improvements made it possible, in spite of the drought, to keep the ponds at a higher level than during the preceding rainy year, greatly to the benefit of the fish life.



The small stock of native pickerel, perch and shiners living in the ponds when taken over had shown a rapid increase in the two years that the ponds were being flowed, and these were reduced by distribution to make the conditions more favorable for the introduced blue gill. The blue gills made a slow increase during these two years. They bred well, and the young thrived in the ponds, but the shallowness and fermentation of the water during the construction period caused losses, and incomplete control when the water was drawn off permitted a considerable escape into Lake Singletary below.

This year, the first that the ponds were in fair working condition, and the first year that a considerable brood stock had been put in, the production was very good, and the control work now being built made it possible to separate these readily from the other fish, and handle them without escapes. There were planted in the Stockwell Ponds as breeding stock 1,380 adult blue gills, 759 horned pout (5 to 8 inches long). There were distributed from the ponds 1,250 fingerling pickerel, 4,095 adult pickerel, 2,900 adult yellow perch, 520 adult horned pout, and 32,000 fingerling and 40 adult blue gills.

## FISH AND GAME DISTRIBUTION.

### FISH DISTRIBUTION.

Distribution of the stock of fish from the hatcheries proceeded on the usual lines, with an increasing proportion of the work done by trucks. A system giving better team-work between the local clubs was worked out, which brought about a more even distribution of the stock turned over to them, and avoided duplication in stocking certain waters and the neglect of others simply through lack of co-ordinated effort. More clubs than before supplied trucks and called at the stations for their allotments, thus releasing more funds for other much-needed work. A rough survey was made of the stream mileage, and the allotments sent into each county were based on the proportion of stream to the total amount of fish to be planted—following the plan already in operation for pheasant distribution.

Distributions are shown in the tables at the end of this section, to which reference is made to supplement the following reports on species put out. No figures are given below which may readily be found in the tables.

*Brook Trout.*—Owing to the shortage of eggs no plantings of eyed eggs in brooks were made. The production of fingerlings was well in excess of last year.

*Pike Perch or Wall-eyed Perch.*—Pike perch work has been discontinued until the results of past stocking are more fully known. Up to this time the results have been meagre as compared with the cost of the work.

*Small-mouth Black Bass.*—Stock obtained by the salvage crew, together with the product of the Palmer Hatchery, comprised the supply for planting.

*Horned Pout.*—There were purchased from a private dealer approximately 100,000 horned pout fingerlings, which were delivered to the Palmer Hatchery and thence distributed. There were also available for stocking purposes 44,000 which had either been held over from the purchased stock of the year before or produced this year at the Palmer Hatchery, together with a number of fry, fingerlings and adults secured in salvage work and from Stockwell Ponds.

*Brown Trout.*—Further examinations were made to determine the suitability of certain streams in addition to those already designated to receive brown trout, having in mind (1) whether the water area to receive the fish was completely isolated by natural barriers so as to prevent them from working into desirable brook-trout waters; and (2) the species of fish already in the streams. Pursuant to the plan to develop certain selected streams as brown trout waters, the crop of fingerlings raised at the Palmer Hatchery was divided among these waters: Konkapot River, New Marlborough; Farmington River, New Boston; Heath Brook, Billerica; Westfield River at various points; Manhan River, Easthampton; Flat Brook, Ware; Eagle Hill Brook, Wareham; Millers River, Athol.

*Blue Gills.*—Fish collected by the salvage crew, together with the product of the Stockwell Ponds and Palmer Hatchery, comprised the stock for planting.

*Alewife.*—The following plantings of adult spawning alewives were made

during the spring run in continuation of the effort to re-establish depleted fisheries:— Ipswich River, Ipswich, 1,450; Ipswich River, Topsfield, 275; Monponsett Lake, Halifax, 970; Stetson Pond, Pembroke, 286; Robbins Pond, East Bridgewater, 362; Lake Nippinicket, Bridgewater, 1,222; Carver Cotton Gin Works Pond, East Bridgewater, 337. The alewives were secured and distributed by the salvage crew and wardens.

*White Perch.*— White perch salvage and distribution was carried along on the usual plan.

*Salvage Unit.*— The salvage crew continued the work of seining waters closed to public fishing for the purpose of re-distributing the stock into open ponds. There were added to the equipment two 10x4 ft. fyke traps and a 300x20 ft. seine of one-inch mesh.

With permission of the owners (whose generosity is gratefully acknowledged) the crew seined the following locations:

Storage Reservoirs at Middleton, R. I., for white perch; Oyster Pond, Falmouth, for white and yellow perch; North Watuppa Lake, Fall River, for small mouth bass fry; General Butler Ames' Pond, North Tewksbury, for blue gills, calico bass, small mouth bass, horned pout fry and adults; North Town Reservoir, Fitchburg, for pickerel and yellow perch; Flagg's Pond, Brockton, for horned pout fry; pond on the lower Cape for adult horned pout. Also throughout the season small salvage jobs by the wardens yielded varied lots of fish.

The fish taken in the salvage work were mostly of good size, a good proportion being of breeding age, and they were used as brood stock for the hatcheries, for Shaker Mill Pond and the Stockwell Pond rearing units, and for general distribution. (See table following.)

*Fish Distribution, 1923.*

	Product of State Hatcheries	Not Hatchery Product (Sein- ing, Gift, Pur- chase, etc.)
Brook Trout:		
Eggs . . . . .	— <sup>1</sup>	—
Fingerlings . . . . .	1,376,431	—
Adults and yearlings . . . . .	7,071	—
Brown Trout:		
Fingerlings . . . . .	39,225	—
Adults . . . . .	5 <sup>2</sup>	—
Small Mouth Black Bass:		
Fry . . . . .	131,000	137,000
Fingerlings . . . . .	68,335	—
Adults . . . . .	5 <sup>2</sup>	818
Calico Bass:		
Adults . . . . .	—	678
Horned Pout:		
Fry . . . . .	—	28,400
Fingerlings . . . . .	44,000	108,810
Adults . . . . .	540 <sup>3</sup>	4,126
White Perch:		
Adults . . . . .	—	55,907
Yellow Perch:		
Fingerlings . . . . .	4,000	2,300
Adults . . . . .	2,900	32,500
Pike Perch:		
Adults . . . . .	—	14

<sup>1</sup> 350 eggs sent to educational institutions for experimental purposes.

<sup>2</sup> To exhibitions, and thence distributed.

<sup>3</sup> 20 of these to exhibitions.

	Product of State Hatcheries	Not Hatchery Product (Sein- ing, Gift, Pur- chase, etc.)
Blue Gills:		
Fingerlings . . . . .	35,620 <sup>1</sup>	—
Adults . . . . .	43 <sup>2</sup>	2,690
Sunfish:		
Fingerlings . . . . .	—	567
Roach:		
Fingerlings . . . . .	—	1,012
Pickarel:		
Fingerlings . . . . .	1,250	757
Adults . . . . .	4,095	645
Alewives:		
Adults . . . . .	—	4,902
Miscellaneous species . . . . .	—	146
	<hr/> 1,714,520	<hr/> 381,272

<sup>1</sup> 45 of these to exhibitions.

<sup>2</sup> 3 of these to exhibitions.

All finally distributed.

#### GAME DISTRIBUTION.

*Pheasants.* — An improved system of supplying applicants with pheasant eggs for hatching was put into operation. The previous practice had been for each station to secure its full quota for the year's work, distributing any surplus, — which, being later-laid, were less fertile. In order to give the public a grade of egg of the same excellence as those used for our own work, a special stock was established at the Wilbraham Game Farm of 307 breeders of Wilbraham and Marshfield stock. The sole function of this flock was to produce eggs for distribution, and after the 8,040 eggs required to fill applications had been secured, the remaining birds, numbering 291, were liberated, still early enough to produce a brood in the open.

The number of young pheasants distributed was 40.5% above last year's output. Auto truck distribution was continued, and two season's experience has demonstrated its worth, though to cover the long distances necessary in the delivery of 500 or more birds in a day, faster trucks are needed. The recently adopted plan of apportioning the output according to the amount of suitable cover in the county insures a fairer distribution than the former plan of allotting according to demand.

*White Hares.* — Northern white hares from Maine were liberated to the number of 1,090. The best results from the liberated stock are sought by (1) limiting the distribution to localities which have the required natural conditions, namely, laurel, hemlock or cedar swamps to give them protection, and snow-covered ground through the winter; (2) making the distributions later in the year, to avoid, as far as possible, turning the hares loose during the open season, to fall prey to gunners before they have had a chance to propagate. While some of the distributions of necessity came in the open season (the open season coinciding with the time of year when the animals can best be trapped), nevertheless it was deferred sufficiently to allow over a month's shipments to come after the season's close. Allotments were made according to the survey of suitable white hare cover made last year, shipments going direct from trapper to applicant. A change in the Massachusetts law now permits the importation of hares and rabbits for propagation purposes at any time of year, if legally captured.



*Quail.* — Through the courtesy of Judge Lee Miles of Arkansas 58 Bob White quail were shipped to the Sandwich Bird Farm. Nineteen were dead on arrival and 17 died afterwards, and the remaining 22 were liberated, together with the station's product.

*Game Distributions, 1923.*

Species and Size	Product of State Hatcheries	Not Hatchery Product (Purchase, Gift, etc.)
Pheasants:		
Eggs <sup>1</sup> . . . . .	— <sup>1</sup>	—
Young . . . . .	9,466	—
Adult . . . . .	619	4
Wood Ducks:		
Young . . . . .	57 <sup>2</sup>	—
Adult . . . . .	1	—
Quail:		
Young . . . . .	20	22
Adult . . . . .	3	—
Miscellaneous . . . . .	4 <sup>3</sup>	25 <sup>3</sup>
White hares . . . . .	—	1,090
	10,170	1,141

<sup>1</sup>8,040 pheasant eggs were distributed from the special stock kept for this purpose at the Wilbraham Game Farm.

<sup>2</sup>Birds found being held in violation of law, and confiscated.

<sup>3</sup>25 adult mallard ducks were trapped at Marshfield, and distributed, and 4 black ducks from Sandwich Bird Farm.

## MARINE FISHERIES.

### INSPECTION OF FISH.

The work for the year shows more activities and more seizures and condemnations of poor fish than any year since 1919, when the office was established. Last year the office aimed to cover the State to the extent of inspecting at least twice, every store selling fish. This year's more ambitious program gave at least three inspections over the whole State, and resulted in a higher quality standard of goods, and also in a larger amount seized and condemned, than in any previous year so far as retail stores are concerned. The great wholesale markets received almost daily calls, and the retail stores in large cities like Boston, Worcester, Springfield and others, received more than three visits. The wholesale, or receiving end of the fish business, that is, ports taking in fish direct from the fishing grounds, were carefully watched; for example, the great Boston Fish Pier was covered on 255 working days.

The double object was to see that fish landed by the vessels was properly graded, and that fish sold by the retailers was actually fit for food consumption. There were many individual cases where small lots of fish were seized and condemned as unfit for food. Throughout the work there has been one watchword, — to see that the consumer who pays for good fish, actually receives what he pays for.

In many instances national, county and city officials have heartily co-operated with the work of this office. On the other hand, some town and city health officials regard the work as an invasion upon their rights, and we have at present the spectacle of a town health official appearing in a court case in opposition to us.

The result of this year's work can best be gauged by public attitude toward the consumption of fish. It is admitted by the wholesale fish dealers that more fish are being consumed in Massachusetts than ever before. This would seem to show that the work of fish inspection in Massachusetts cannot be counted as

lost labor. Both dealers and the fish-eating public are not only becoming better acquainted with the fish inspection laws, but are coming to see that they are enforced for their own direct benefit. They not only welcome the visits of the inspector, but on many occasions send for him to pass judgment upon shipments of goods. As Massachusetts is the largest salt and fresh fish producing State in the country and many millions of pounds of fish landed within her borders and inspected by this office go out to other States, the basic value of the fish inspection idea can readily be seen.

#### *Court Cases.*

It has been the attitude of this office to go as far along with the "good fish education" campaign with the dealers as was humanly possible, and when it was found that this fair standpoint was abused, the guilty parties were brought into court. With the knowledge in mind, however, that every day spent by the deputies in being tied up at court was lessening their work in market inspections, a great deal of care was taken that the prosecution work should not outweigh the value of daily inspection work. For this reason, only in cases where it was deemed absolutely necessary were infractions of the law brought into court. The total number of cases brought in for the year was 23, and it is testimony to the efficiency of the work of the inspectors that 20 of these resulted in conviction, the other 3 being discharged on what might be termed technicalities. Several of these cases were very strongly contested by the defendants, which makes the work of the deputies all the more significant. Several of the cases were carried up to the Superior Court, but in every such case, decision by jury was rendered in favor of the prosecuting deputy. In many cases the Judge on the bench took occasion to lecture the defendants for trying to sell bad fish to the public.

#### *Inspection at Producing Points.*

The Inspector has personally visited the larger fish producing ports along the coast, including Gloucester, Boston, Provincetown, Chatham, Edgartown and Nantucket, and has also taken occasion to survey the retail situation in some of the larger cities. From May 1 to Oct. 1 he devoted 3 days each week to the handling of the fresh fish situation at Gloucester, where trips aggregating some 26,000,000 pounds of fish were brought in, and instead of being sold fresh for consumption, were split and salted to become the famous salt fish sold all over the country and for which Massachusetts is noted. It is the opinion of the Inspector, after making these trips, that the standard of fresh fish sold in this State will compare more than favorably with the product produced and sold in any State in the country.

During the inspection work at Gloucester it was necessary to condemn as unfit for food all but 43,000 pounds of the 175,000-pound trip of one otter trawler. It is felt that this rather drastic but necessary action on the part of the Inspector had an influence for good throughout the fishing season. Besides this condemnation, several small lots of fish, some as high as 25,000 pounds of poor fish, were condemned out of trips and thus prevented from reaching the consumer. Further, all so-called "loggy" or "sick" fish from these splitting trips were prevented from reaching those who might have made unscrupulous use of them.

#### *Jellied Swordfish.*

Last year's decision to condemn the whole of any swordfish, any part of which was found to be jellied, has been carried out with good effect. In most cases our decision was met with favor and the general attitude of the dealers was to co-operate to the fullest extent. It is felt that this decision of the office served not only to keep unwholesome fish off the market, but also to stabilize the price. As showing the effectiveness of the decision it might be stated that among the swordfish shipped to this country from Canadian ports via the Yarmouth steamer, some 50 fish weighing 14,598 pounds were condemned as being jellied, while of the swordfish landed at the Boston Fish Pier, 118 aggregating 23,132 pounds were also condemned. Besides this, many fish were also condemned at Edgartown and New Bedford.



*Blackstone Street Fish Market.*

As is well known, the Blackstone Street fish market is comprised of a number of carts, the owners of which are licensed by the city of Boston, and derive their supply of fish mostly from the Boston Fish Pier. Since this office was inaugurated in 1919 a strong effort has been made to clear up what has been considered to be one of the "danger spots" of the business. At the start some 15 carts were in operation. At the present time but seven are conducting the business. This market caters to the poorer class of people and this office feels that goods sold to them should be of as good quality as that provided for the more fortunate who can, and do, patronize the higher class of markets.

One by one, carts have disappeared, unable apparently to withstand the strict inspection of the deputies, giving up their business. Others, sensing the state of affairs, have made it a point to carry good goods. Still others were, in the common parlance, evidently willing to "take a chance." Some of these latter, after repeated warnings and condemnation of fish, have been brought into court, where heavy fines were imposed. At the present time, average conditions in this open air market are better than for the past five years, but as any relaxation of inspection work here would unquestionably militate against the buyer, it is intended to continue this same rigorous policy.

Out of the Blackstone Street situation, one fact comes with striking force; several of the cart proprietors are men who during the week work at and for some firms on the Boston Fish Pier. The fish they offer for sale also comes from the Fish Pier, and, as shown by inspection and condemnations, the goods offered are oftentimes actually unfit for food. The answer is obvious, and the remedy is in the hands of the Fish Pier dealers themselves.

*Inspection of Imported Fish.*

During the past year considerable attention has been paid to fish arriving at the port of Boston from Nova Scotia ports via the Yarmouth steamer, and to fish from Canada consigned to the Boston Fish Pier by rail. The worth of this work may be shown simply by stating that during the year from Canadian shipments, some 15,000 pounds of swordfish, over 6,000 pounds of mackerel, besides several hundred pounds of eels and smelts, have been condemned.

A plan for the inspection for these imported fish, particularly those arriving by the Yarmouth steamer, has been worked out with the hearty co-operation of Hon. W. W. Lufkin, Collector of Customs of the Port of Boston. In former years it had been the habit to open at the steamer wharf practically all of the boxes and barrels of fish shipped in; this in order that the fish might actually be weighed and the duty thereon properly assessed. As a result of conferences with Collector Lufkin, it has been possible to notify Canadian shippers of the necessity of marking their packages with the actual weight of goods therein contained, and also, instead of opening every package at the pier, to open enough to show by "average" that the amounts marked on the various packages was approximately correct, the weight of each package being later verified at the Fish Pier. This has practically saved one handling of many thousand pounds of fish, and as fish deteriorates with every handling, the point is obvious.

The commission dealers of Boston readily saw the value of the new plan, and co-operated to the extent of impressing upon their Nova Scotia shippers the necessity of making the actual weights upon each package. As a result of this agreement, no hooks are now being used on halibut, mackerel and salmon. Even the packages that are weighed to ascertain the average weight, are being handled more carefully. It is pleasing to note that as soon as the "better fish" idea is put up strongly to high officials, they immediately see the value of the plan and are willing to co-operate in every way.

Also, through co-operative effort with the office of Collector Lufkin, it has been made possible to rebate duties on fish shipped from Canada and condemned by this office. Efforts are now directed toward extending the rebate of duties on fish condemned, to rail-shipped goods coming over the border.

The Inspector of Fish acknowledges with thanks the assistance of Hon. W. W. Lufkin, Collector of Customs of the Port of Boston and patrolman George E.



*Acknowledgments.*

McCaffrey, special investigator attached to the office of the District Attorney of Suffolk County; also to Attorney General Jav R. Benton and District Attorneys Thomas C. O'Brien of Suffolk County and Arthur K. Reading of Middlesex County.

*Work Accomplished.*

Inspections in retail stores, 3,967.

Inspections in wholesale stores, 7,385.

Freezer inspections, 260.

Inspections of peddlers' carts, about 200 weekly at Boston Fish Pier.

Inspections at Yarmouth, N. S., steamer, 80.

Vessel inspections, 102.

General inspection trips, 9.

Fish condemned, landed direct from vessels, 185,520 pounds.

Fish condemned in retail stores, 5,740 pounds.

Condemned at Boston pier of the Yarmouth, N. S. steamer—190 pounds eels, 6,130 pounds mackerel, 200 pounds smelts.

Condemned at Fish Pier of consignments on Yarmouth steamer; these being graded as "jellied", 50 swordfish, 14,598 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 2,834 pounds smelts.

Condemned, landed in Boston from North Carolina, 500 pounds shrimp.

Condemned at Boston Fish Pier, 250 pounds perch.

Condemned, landed at Boston Fish Pier, 5,700 pounds mackerel.

Condemned, landed at Boston Fish Pier; graded as "jellied", 118 swordfish, 23,132 pounds.

Condemned, received by rail at the Fish Pier, 1,400 pounds salmon.

Total amount condemned at Boston Fish Pier and received at Boston from Canada by rail and steamer, 53,384 pounds.

In addition to this, out of two cars of Western salmon, aggregating some 40,000 pounds, 4,980 pounds were culled as No. 2 fish; 1,965 pounds were culled as No. 3 fish and sent to be smoked, salted or otherwise preserved. It is but fair to say that a part of these shipments went along to New York without being landed at the Fish Pier, and without our knowledge.

In addition to the above many hundreds of thousands of pounds have been graded according to law, and several thousands of pounds were prevented from going into the freezer and sent to be split and salted or otherwise preserved.

*Conclusion.*

The latest figures issued by the United States Bureau of Fisheries show that the annual per capita consumption of fish in the United States is 14 pounds, and also that the annual per capita consumption of fish in the State of Massachusetts reached the height of 24 pounds. When it is considered that but a few years ago the per capita fish consumption in the Commonwealth of Massachusetts and in the country were approximately the same, it would seem that the action of the State in establishing this office in 1919, has borne good fruit.

*THE DEEP SEA FISHERIES.*

The upward slant recorded for the marine fisheries of the Commonwealth at the close of the fiscal year of 1922, has been continued during 1923 and November 30 finds the condition of the oldest industry of the State such as to cause both fishermen and dealers to review the work of the past 12 months with a greater feeling of satisfaction than at any time since the signing of the Armistice. The slump that followed this famous event is too well known to need comment. Admittedly our fisheries were then in a condition approaching demoralization and the future looked dark. The fishing and financial results for 1922, however, were such as to restore confidence that the future was safe, and now the returns for 1923 have confirmed that opinion.

The Massachusetts landings of salt water fish during 1923 were well above

1922, prices ranged generally higher, trade was improved and more stabilized; in short, it was perhaps better than a normal year, and, best of all, confidence has now fully taken the place of doubt in the minds of both those who catch and those who sell Massachusetts fish.

In some respects the 1923 returns of our fisheries were remarkable and hardly a branch can be mentioned in which the results were below that of an average year. In the first place the great fleet of winter haddockers, which markets its catches at the great Boston Fish Pier, enjoyed what competent observers declare to be the most remunerative season in all its long history. In spite of almost continual storms on the fishing grounds, the catch exceeded that of the 1922 season, prices generally held at an unusually high level and at times soared to record heights. It was a most auspicious opening of the new year — a promise of good things to come, which promise was fulfilled in many ways.

The halibut fleet, for the fifth successive year, met with marked success in its operations; the summer fresh fishing fleet operating on Georges and the fishing grounds to the eastward, brought home an aggregate of catch of splendid quality and fully up to if not ahead of the 1922 fleet in amount; the swordfishing fleet, while not landing as many fish as last year, yet because of higher sustained prices throughout the season and the absence of market glutting was able to record a very successful year. But perhaps the most pleasing chapter of the interesting marine story of the year was the turning of what promised to be an unusually lean year in the mackerel fishery into one of the most prosperous and successful in many, many years — a quarter century or more some say — this by the sudden striking in along the Massachusetts coast and contiguous waters of a flood of schools of small mackerel in the late Fall, the like of which has not been recorded since 1887 or 1888.

Another factor in the year's success for local catchers and shippers was the U. S. Tariff Act, which placed a duty on imported fresh, salt, frozen, pickled and prepared fish. These tariff provisions, while not visibly increasing the price of fish to the consumer, yet did protect to a marked degree the Massachusetts fishermen against the uneven competition of Canadian-caught fish shipped to this market and which for several years had been allowed free entry to our markets, admittedly to the financial detriment of the hardy fishers of the Old Bay State.

As to other features of the year, — a larger fleet, particularly steam otter trawlers, operated than last year and the trade in fileted fish, only recently an experiment, has increased markedly. The preparing of fish in this manner, each separate filet parchment-wrapped and shipment made in metal containers iced from without and transported in refrigerator cars both by express and fast freight, has broadened greatly the zone of safe shipment of fresh fish in large quantities; indeed, shipments have been made across the full width of the continent to San Francisco, the fish arriving in good condition. This fileting of fish has also given almost steady labor to an increased number of expert fish cutters, who at times have been obliged to work long overtime that the firms might keep up with their orders.

And so, although 1923 cannot be said to have brought unusual profits to fishermen and dealers as a whole, it has brought much to be thankful for; it has dispelled doubt and, best of all, it has brought renewed and increased confidence in the stability of the industry.

The various branches of the State's fisheries, together with résumés of fisheries operations at various ports and fishing localities are briefly and concisely treated under the following headings —

#### *Winter Haddocking Fleet.*

In all the history of this fishery, extending back some 70 years or more, the winter season of 1922 and 1923 must be recorded as the most remunerative on record. While the weather generally from December 1st until well into February and also some parts of March was severe and would naturally make for small catches, yet the large fleet of splendid sea-worthy vessels and steam trawlers engaged, apparently took little notice of it and encouraged by an exception-



ally high standard of prices offered for their goods at the Boston Fish Pier, this in part induced by a gratifying increase in demand for Massachusetts caught fish, the captains and fishermen themselves practically defying the elements and in spite of one of the worst winters in recent years as far as weather conditions were concerned, practically at times took their lives in their hands and in their efforts to secure the full benefits of high prices offered during the winter, had landed fish, up to March, at the Boston pier in excess of five million pounds over the previous season. High prices were never before so long sustained and at times the dealers on the pier were actually hungry for fish.

January was a very stormy month and opened with very light receipts which sent the prices soaring, to the effect that many large stocks were made. During this month haddock sold freely at 11¢ per pound and also reached the pinnacle of 15¢.

Lent opened on Feb. 14. It was preceded by rough weather and light catches, although some fares from Western Bank were large. The demand, in anticipation of the Lenten trade, was brisk and also continued good throughout the month. Prices continued high and the offshore vessels profited accordingly. No such conditions as these had been experienced since 1918.

The latter part of the month brought quite a marked change in the number of arrivals and the amount of fish brought in, for on February 23, the Boston Fish Pier recorded 31 arrivals with an aggregate of 1,505,550 pounds of mixed fresh groundfish, mostly large codfish, which was one of the largest day's receipts for at least over three years.

The closing week of February was marked by the largest fresh fish receipts at the Boston Fish Pier in any one week since March 1919. In the former week 5,667,090 pounds were received, three million pounds of which were large codfish and for one of the few times since the hard winter season opened in December were fish sent to the splitters.

During the month of March some of the worst storms of the season were experienced, but nevertheless the fleet stuck persistently to its hazardous work bringing fair catches and receiving the reward that the hardy fishermen deserved.

April was marked by large receipts and as was to be expected at this season of the year, prices dropped, with the splitters having their opportunity to secure a goodly supply.

#### *The Summer Fresh Fishing Fleet.*

Practically two fleets engaged in fishing for groundfish during the months from May through September, one going for capacity fares, to be landed for splitting and salted and the other tending the market at the Boston Fish pier. The vessels of the first named generally marketed their entire fares at the wharves of the Gloucester shippers and curers. At times during the season, when a good market promised, some would first try the Boston market, there discharging part of their fares, then bringing the remainder to Gloucester. The other fleet, fishing generally on Georges or in South Channel, made the Boston market their objective point at all times, making shorter trips and also bringing smaller "market" fares which went to supply the demands of the retail trade of the Boston wholesalers throughout the State, and other farther-off markets.

As in the past two years, captains and crews specialized on quality, which was pleasing to the dealers and showed the effect of the State's efforts along the line of rigid fish inspection. This quality advance had its reflection in better prices than the previous year. The season's catch aggregated about the same as last season when the total of fish brought to Gloucester for splitting and salting was about 25 millions of pounds.

#### *Swordfishing Fleet.*

The swordfishing season of 1923 resulted in a smaller catch and higher average sustained prices than 1922, which year, as far as landings were concerned, was probably the best on record. The first fish of the season, only two in number, sold at 50¢ per pound. Throughout the whole season there was no "glut" and the lowest point touched was 16¢ per pound. The first trip landed at Boston sold for 37¢ per pound, this on June 26, while the last craft to arrive home



October 9, had no difficulty in securing 35¢ per pound. This will give an idea of how well prices were sustained.

The first swordfish of the season to arrive at the Boston Fish Pier were two in number, shipped from Block Island. These fish arrived on June 19. A larger fleet probably than ever before in the history of the industry was engaged, this being due to the fact that for the first time in many years swordfish showed in large numbers on the fishing grounds "to the westward"; that is to say, that in the waters contiguous to Nantucket, Marthas Vineyard and Block Island. During the season 900 fish were landed at Woods Hole, 1,675 at New Bedford and 400 at Edgartown. Scattering fish were landed at other ports along the Cape, and even Connecticut ports received an unusual supply.

As for the swordfishery in the main, the fleet was about the same size as last year and operations were conducted practically on the same stamping grounds as of yore, Georges and Brown's Bank. Throughout the season, while there were spells of fine swordfishing weather, there were many occasions for days at a time when foggy and windy weather interfered with fishing operations.

The total landings of swordfish from Massachusetts crafts at the Fish Pier, the season closing with the last arrival on Oct. 9, amounted to 14,413 fish in count as against 17,530 last year, so that while the catch fell short of the record season, still the increased total of fish landed at ports to the southward must have brought the season's results very close to the big returns of 1922. This coupled with the much higher average price for the season marks the story of the 1923 swordfishing fleet as satisfactory both in catch and price.

#### *The Mackerel Fishery.*

Although the mackerel fishing season opened with not too satisfactory results as far as the southern fishery was concerned, and also considering that the Cape Shore fishery, usually one of the standbys as far as results are concerned, was not too gratifying, and that after that for many weeks the catch was very light, it is really gratifying to write that the mackerel season of 1923 was probably the greatest in amount of catch that has fallen to the lot of the fishers of this State since 1887. True it is that in 1896 the catch of salted mackerel was some 77,000 barrels, but these were days when, outside of the southern catch, almost all fish caught were salted on board the vessel and landed barreled and salted. Therefore the bald statement that the mackerel fishery season of 1923, as far as Massachusetts vessels are concerned, produced 121,000 barrels of fresh mackerel and 3,864 barrels of salt mackerel, shows conclusively the pre-eminence of this season's fishing. When it is considered that the great bulk of these fish were taken in a few weeks in the late fall, and most all of them caught in waters of or contiguous to the State of Massachusetts, it is safe to say that even forgetting 1888 and 1887, when the bulk of the catch was made in the Bay of Fundy, that one has to hark back to 1885 to find its equal. Therefore, it is safe to say that no mackerel season in the past 38 years has given the fisher folk of Massachusetts so great satisfaction as have the seven months just concluded.

However, it may be better, before speaking of the great "strike", to trace the operations from the spring, beginning in southern waters. The seining fleet from Gloucester, the headquarters of this fishery, was later in fitting away than last year, the first vessel sailing on April 6, whereas in 1922 the first craft got away on March 27. It is also notable that close on the heels of the first seiners the great mosquito fleet of netters also got underway and were but a few days behind their larger brethren. The fleet of seiners was somewhat smaller than last year, but it is figured, counting the sailings from all Massachusetts ports, that the fleet of netters was larger than ever. So strong was the mackerel urge that many of the Italian shore fleet ventured to the southward equipped with mackerel nets.

The first landing of southern mackerel was made by the steamer Orion, Captain John Dalhmar, on April 9 at Norfolk, Va., the craft landing but three barrels of large fish which were caught in from 30 to 40 fathoms of water in latitude 37.50 North. On arrival at the New York wholesale market these fish

brought 75¢ per pound. Following this small fares were landed at Lewes, Delaware and at Cape May. On April 12, Sch. Catherine Burke, Capt. Lemuel Firth, arrived at New York with 15,000 pounds of mackerel which weighed one-half pound each. Owing to the small size of these fish they were in light demand, first sales being 35¢ per pound and then declining to 22¢. The southern fleet continued to meet with such windy weather that often the entire fleet was forced to go into Cape May for harbor. Late in April the netters began to be heard from. Up to April 27th they had landed but 800 pounds of fish and these were caught well to the southward. During the last days in April the netters did a little better, taking their fish from 20 to 90 miles south of Cape May, the fish averaging about  $2\frac{1}{4}$  pounds each, the price being so low that they were offered on the Boston market at 40¢ per pound. Up to May 4 the southern catch had been very light, owing to unfavorable weather conditions and the fleet of 15 sail of seiners and 136 sail of netters had fared poorly. For the next week the total landing of this great fleet aggregated but little better than 3,000 barrels, practically of small fish and landed at Cape May, Atlantic City and New York. By May 18, the seiners, discouraged with the outlook to the southward, were operating about Long Island and some had started for Gloucester to refit for the Cape Shore. The season up to this time had been a failure, the total catch being 7,982 barrels as against 13,584 barrels to the same date in 1922.

About now reports were beginning to come in of fish heading for the Cape Shore, word being received that on May 14 Canadian scout mackerel cruisers had sighted mackerel schooling 20 miles southwest of Cape Sable, this being three days later than the first report of last year. During the latter part of May some mackerel were found by the seiners to the southwest of Block Island. These fish were mostly large and also a number of catches of small fish were made. Up to June 1 the net fishermen continued to get a few fish in the Block Island region. Early in June came the first good reports of mackerel schooling on the Cape Shore. The first this year seemed to strike in around Sambro, in the neighborhood of Halifax, instead of showing first off Liverpool and then working up the coast. First arrivals at Boston were on June 8, when the Sch. Good Luck arrived with 70,000 pounds fresh, and Steamer Thelma with 50,000 pounds fresh. The fish were all large.

Practically speaking, the southern catch of fresh mackerel for the season was 14,000 barrels against 20,000 the previous year. Hampered by bad weather, catches on the Cape Shore were not as large as was first expected. The fish moved rapidly to the eastward and the fleet chased the fish as far as Louisburg, Cape Breton, off which port the last catches were made. Notwithstanding the bad weather and the fact that the fish worked to the eastward very quickly, the Cape Shore catch as far as fresh mackerel are concerned was practically the same as in 1922, the salted catch being a great deal smaller.

Throughout July, small mackerel weighing about one-half pound each, were taken all the way from the South Shoal Lightship to Thatcher's Island, but large mackerel were scarce. As the season advanced these small mackerel grew rapidly in size so that by the middle of July many of the fish taken weighed from  $\frac{3}{4}$  of a pound to a pound each, most of the latter being taken off Cape Ann and on Middle Bank. This condition of affairs continued throughout July, the landings, however, being very small. In fact, so discouraging had become the situation that the larger part of the larger seining vessels had given up the "voyage" and were hauled up at their various wharves in Gloucester. During August the small crafts continued to land a few tinker mackerel, all practically taken on Middle Bank. The situation became so discouraging that even many of the smaller crafts forsook the pursuit of mackerel and engaged in swordfishing. During the latter part of August prospects assumed a brighter hue and over 3,000 barrels of small mackerel of very fine quality were taken on Middle Bank which encouraged greatly the mackerel fishermen.

The second week in September saw the advance guard of the catches which was to conclude in November, probably the greatest strike of mackerel that the Massachusetts coast has experienced in almost the last half century. The first fish were taken off the Maine coast, the fish being small, weighing about one



pound each, but of very fine quality. Large catches immediately followed, made off Boom Island and the Isle of Shoals. Encouraged by this good fishing, several of the large seiners immediately fitted out and sailed. To give an idea of the abundance of the fish it can be stated that in the second week in September 13,933 barrels were landed and for the week ending September 20, 21,510 barrels of fresh and 637 barrels of salted fish were added to this total.

So heavy were the landings at Boston and Gloucester that it was absolutely impossible to market all of these fish fresh and many thousands of pounds were taken to the wharves of the curers where they were split and salted. The week ending September 27 added some 19,000 more barrels to the already large growing total, the most of these fish being taken off Boston Lightship and Thatcher's Island and other Massachusetts fishing spots. As an indication of the prosperity which hit the mackerel seining fleet the statement that up to October 4th, 102,000 barrels fresh had been landed as against 39,000 barrels the previous year will tell the story far better than a column of description. The mackerel schools, as was to be expected, worked gradually toward the southward and toward the middle of October the body of fish was in the vicinity of Provincetown and good catches continued to be landed. It should be noted here that during all this time so great was the catch that the fresh fish market was absolutely unable to absorb the wonderful influx, with the consequence that practically every wharf in Gloucester was alive with men busy with splitting knives salting down fish. It can be safely estimated that at least 18,000 barrels were put under salt in Gloucester from this great drive of fish, these fish averaging salted about 300 to the barrel. The following two weeks saw landings of about 6,000 barrels weekly and then an easterly storm put quite a damper on further fishing, but it must be remembered that during most of the time previously referred to, fish were found in Cape Cod Bay with the result that up to almost the middle of November the mackerel seiners succeeded in making good catches in these waters.

The fall mackerel netters this year, the fleet not being as large as last year, delayed their start on account of the dark nights. When they got into operation they found fish very scarce and this story practically continued throughout the season, although there were one or two spurts when fortunate crafts fishing as far as 22 miles off shore were able to make large and paying hauls. Naturally the fish caught by these netters were of the largest kind, and while prices were good, they were not commensurate with the worth of the product. The netters up to the time of the closing of this report, Nov. 30, had really done poorly, but were still continuing their operations.

It can be said safely that the season of 1923 was one of the most prosperous that Massachusetts mackerel fishermen have had the fortune in the last 40 years to engage in, at least as far as financial returns are concerned, and this goes for the catch total, striking off just a few years. The fish, being of the one-pound size, were such that they were eagerly bought in the markets by the trade. Also the size proved to be a "seller" as far as salted fish were concerned and the facilities of the concerns putting up the salted article were taxed to the utmost to keep abreast of the demand of these goods. According to the judgment of expert mackerel men, next year should see a repetition of these fish along our shores because that season should bring them to the full tinker size and reproductive age. Should this belief and also this wish come true, then Massachusetts fisheries are in again, as far as mackerel is concerned, for another large year.

The Massachusetts catches of fresh and salted mackerel from December 1, 1922 to Nov. 30, 1923, inclusive; and for the corresponding period of the two previous years were as follows:

	Dec. 1, 1922 to Nov. 30, 1923	Dec. 1, 1921 to Nov. 30, 1922	Dec. 1, 1920 to Nov. 30, 1921
Salt mackerel (barrels) . . .	3,864	2,749	3,242
Fresh mackerel (barrels) . . .	121,000	50,203	40,323
	<hr/> 124,864	<hr/> 52,952	<hr/> 43,565



*Cape Shore Catches of Mackerel for Eight Years.*

Year	Arrivals	Fresh Mackerel (Pounds)	Salt Mackerel (Barrels)
1923	31	1,240,680	211
1922	48	1,353,900	2,344
1921	29	2,160,000	3,003
1920	30	1,290,000	3,217
1919	32	2,119,000	6,275
1918	38	1,689,000	7,558
1917	32	2,229,000	7,131
1916	24	1,161,000	3,718

*Salt Bank Codfishing.*

The fleet frequenting the eastern fishing grounds and salting their catches on the banks was somewhat larger than last year. When it is considered that 15 and 20 years ago this salt bank fleet so-called numbered 40 and 50 sail of fine, large vessels and known as "the backbone of the fishing fleet", one can readily discern at least one radical change that has come about in the fishing business and fish industry.

Uneven fishing was met, and while some of the vessels fared well, others of the little coterie did not do as well as anticipated. Prices were a little higher than last year, and as a whole, while the total catch was practically the same as in 1922, the result of the March to October season, each craft but one making the usual two trips, can be termed no better than "fair." As was the case last season, one Boston steam trawler operated with the fleet.

*Fresh Halibut Fleet.*

The continuing success of the fresh halibut fleet is a marked feature. Previous to 1919, for several years it looked as though this branch of the industry might soon be discontinued, so poor were the fishing and financial returns from the trips. Indeed for a time but seven vessels engaged, with indifferent success. But in 1919 the situation changed; the fleet was considerably enlarged, fish in goodly numbers were again found on the once prolific grounds to the eastward, Quero, Sable Island, St. Pierre, Green and Grand Banks, as well as on Georges and Browns, and the season closed with an encouragingly enlarged catch and gratifying money return, indeed the prices received, even with the increased catch definitely put Atlantic halibut in the fish luxury class and in spite of a larger fleet each succeeding year and also a gradually ascending catch total there this delicious fish remains today.

The fleet this year was the largest in recent times, some 28 crafts operating. The total catch was slightly below that of 1922.

*The Gill Netting Fleet.*

There is nothing of an encouraging nature to report in the operations of this fleet. As at present conducted, the fishery is pursued by less than ten boats, all of gasoline power. From December 1 to February 28 these persistent little shore fishing fellows conducted their fishery in the face of the worst weather and ice conditions since 1919 and perhaps even before that. It is to the credit of the captains and crews of these crafts that they were able to return at the end of the season in May a total of 4,156,600 pounds landed of the finest quality of fish. When it is considered that inside of ten years the fleet operating in this fishery has declined from 40 crafts to 10, the answer is plain to those who follow closely fisheries matters. The boats engaged in this fishery operated under high expenses.

*Cape Cod Activities.*

The fishing year as far Cape Cod is concerned showed a very gratifying forward impulse. While certain species of fish did not show in usual numbers, still others came along and were caught in such unusual quantity that it made

for the Cape a far better than an average year. At Provincetown and Chatham the traps were fortunate in having an unusual run of mackerel. These fish began to come in in June, and the run lasted until the end of the season. The Fall run of mackerel in the traps at Provincetown was probably the best on record. As for the spring fishin, in April and May the traps took mostly herring, of which there was a good catch. These fish went about 45 to 50 pounds to 100 count. The spurt of whiting, which in some years has been the major fishery, was not in evidence until late; then the fish came in in fairly good quantity, but the run was short. Squid throughout the whole season were very scarce.

Taking it altogether, the season from the freezer standpoint could be counted an average one.

At Chatham, competent judges say that the fishing year was the best for the last quarter century. Catches were good, also prices. The run of mackerel late in the spring was remarkable both for the trap and the net fishermen. The fish were extra large in size and no difficulty was found in marketing them at satisfactory prices. Later in the season small mackerel came in evidence and the traps did well, making good catches. Butterfish here were in fairly good receipt. Herring early in the season were quite plenty and taken in goodly quantity. There was quite a steady catch of squid but in no large amounts. Practically no whiting were taken.

At Barnstable and vicinity and up in the vicinity of Sandwich there was a fairly good run of whiting. Later on the traps in this vicinity shared in the splendid run of small mackerel that obtained all along the coast.

Around Plymouth County the fishing for codfish as usual was confined almost entirely to handlining and trawling from small power boats. The catch has been a normal one. The traps in Cape Cod Bay did not do as well in the catch of mackerel as last year.

To sum up the Cape Cod situation it can be said that the mackerel catch was unusually large, the herring catch was larger than the previous year, less butterfish were taken, also less squid and less whiting.

#### *Buzzards Bay Fisheries.*

The fisheries of Buzzards Bay are closed entirely to seining of all kinds and open only to handline and trap fishing under license from the State. Most of the fish in this wonderful body of water are caught for sport and for home consumption and but few sold commercially, in fact there is practically no commercial fishing in the Bay except by traps. Apparently conditions remain about the same as last year, with reports of a normal catch.

It would seem, from accurate reports regarding Buzzards Bay fisheries, that the catch in the Bay itself as far as the totals are concerned, is of very little moment when considered in the amount of fish landed at various ports in the State. Indeed, it might be said that at the present time, so far as the fishing in Buzzards Bay is concerned, "there ain't no such animal." The few traps that were set this spring did not pay for the labor, and several of them were taken up early. The prospects at the present writing indicate that very few will be set next spring.

#### *Marthas Vineyard and Nantucket Fisheries.*

The report of the Marthas Vineyard fisheries of the year shows not so successfully as the previous year. Alewives were not plenty; in fact the catch was only about 3,000 barrels, which is about one half the catch of the two preceding years.

The mackerel fishery was a failure. Possibly 200 barrels were landed at Edgartown by the spring netting fleet and after that the season was a blank.

The most encouraging feature to regard is the doings of the swordfishing fleet. This work was mostly confined to small boats with two or three men. More swordfish were found on the in-shore fishing grounds than for a number of years and the fishermen profited accordingly. It is estimated that these small boats landed at least 400 fish at Edgartown, while the larger crafts marketed their catches at Boston. The fleet in these waters was greatly aided by unusually



fine weather. The catch of bluefish and sea bass was practically nil, while more scup were taken than for several years.

At the westerly end of the island the traps had what might be termed a good season, being favored by a good catch of mackerel and quite a few butterfish. The traps, however, took but a few scup. Very few salmon were taken in the traps and no catch of bluefish is noted. There was no run of bait fish along the shore and no spurling were taken. The fishermen report seeing very few schools of porgies. The netting crafts did practically nothing.

At Edgartown the usual number of crafts engaged in the flounder fishery, the catch being quite large, as was the case in the previous year. As was to be expected, the prices at times were low, but on the general average it can be said that the flounder boats enjoyed a good season. At this port very few spring mackerel were landed. Less were landed as the warm weather came on and the most of the fleet quit operations in June.

The fisheries year at Nantucket can safely be called a good one and fully up to the standard of recent years both as regards price and production. This port is the center of the intensive flounder fishery and here congregate as a base, from 50 to 60 splendid motor equipped crafts which pursue their calling in the dangerous waters of the Nantucket shoals. The business of flounder fishing has become an all the year round one for many crafts, most of whom land their trips at Nantucket from whence they are shipped by steamer to New Bedford and thence on to the New York market which is the biggest outlet for this species of fish.

It occurs many times during the season that crafts fortunate enough to secure full cargoes will drive directly to New York and there market their catch. But as a whole the major portion of the catch of this fleet is landed and barreled and iced at Nantucket, the season's total landed there being 19,818 barrels.

Beside the amount shipped from Nantucket it is safe to figure from 35 to 40 per cent more were taken through direct to the New York market. This would give an approximate total of the state's flounder fishery of at least 10 million pounds.

As in the past two years but one craft has engaged in sturgeon fishing. This boat met with very poor success and after a short time put its nets ashore and engaged in other lines of fishing, the catch being the smallest for years.

During the spring and summer some of the fleet engaged in mackerel netting and in swordfishing, the former with very indifferent success and the latter with good fortune.

It is noticeable that while the lobster fishery, generally speaking, along the coast was far below the average, yet at Nantucket it was the best for several years.

Quite a number of crafts engaged during the summer in fishing for flukes to the southwest of the Island and did very well. These crafts fished practically in sight of land and about 20 were engaged.

In addition to the large amount of flounders landed at this port, many thousand pounds of cod and haddock were also brought in, being taken on Nantucket shoals by the flounder draggers in their otter trawls.

During the summer season quite a number of the fleet engaged in handlining on the grounds off No Man's Land, on The Rip's and on Cox's Ledge. At times as many as a dozen crafts were engaged in this line of fishing, some Edgartown boats being among them. They met with good success.

No mackerel netters engaged in local waters and very few mackerel were landed here. It is noticeable however that since the first of August the harbor was alive with great quantities of small mackerel.

#### *Boston Fishing Activities.*

The receipts at Boston this year showed a gratifying increase over 1922 of some 17 million pounds. During the winter, prices ranged higher and trade showed a gratifying and steady increase. The total here given in the table below represents the fish actually landed at the fresh fish pier and does not include fish brought to the pier by vessels which afterward went to Gloucester to



dispose of their catches. As a whole the condition at the Fish Pier showed a very gratifying improvement over 1922, the scope of marketing fresh fish being considerably increased and a noticeable improvement being made in quality shipped.

As compared with the previous year, codfish were in much greater receipt, haddock showed a slight gain, while there was a noticeable falling off in the receipts of halibut, these fancy fish being fully a million pounds short of the 1922 catch. The greatest and most gratifying gain came in fresh mackerel, where the total was close to seven million pounds marketed, something that has not been attained in the memory of the average man now in the business on the pier.

*Receipts of Fish at Boston Direct from the Fishing Fleet from December 1, 1922 to December 1, 1923.*

Large Codfish . . . . .	23,332,261
Market Cod . . . . .	14,437,335
Cod Scrod . . . . .	139,495
Haddock . . . . .	55,022,313
Haddock Scrod . . . . .	3,194,234
Large Hake . . . . .	75,319
Small Hake . . . . .	3,853,305
Pollock . . . . .	3,108,040
Cusk . . . . .	1,858,788
Halibut . . . . .	3,048,210
Fresh Mackerel . . . . .	6,667,147
Miscellaneous . . . . .	6,328,826
	<hr/>
	121,065,273

The above figures are furnished as usual by Fred F. Dimick, Secretary of the Boston Fish Bureau. As Mr. Dimick has for years been the authority on Boston fisheries matters it is very interesting to read the following paragraphs which are his sum-up of the year as far as the Boston Fish Pier is concerned.

"During the year 1923 the business in fresh fish has improved, but while a large quantity of fish has been distributed there is much competition, and profits have not been large. There was a large body of small mackerel on the shore, and the supply of these fish was the largest for many years. Groundfish have been in good supply, and more steam trawlers are operating than for several years.

"A number of dealers are engaged in the packing of haddock fillets in which the trade has increased. These fish are largely shipped to points west into practically new markets. This is possible, as packed in cans and wrapped in parchment paper, the fish arrive at their destination in perfectly fresh condition. Shipments have been made to California.

"The transportation charges are still high, and continue to be a drawback in the distribution of fish.

"The tariff on fish which went into effect in the Fall of 1922 has restricted shipments of fresh fish from Canada.

"The cost of operating fishing vessels has not changed much from the previous year, but the vessels as a rule have had better stocks than in the previous year. The new Sch. Lark, Capt. Ernest Parsons, stocked \$140,000, the crew sharing \$3,400 each, which is the largest stock ever made by a fishing vessel in one year engaged in the haddock fishery. While a few vessels have made big stocks the stock of the average vessel, however, has not been high.

"The catch of fish in the traps on Cape Cod has been light. The amount of bait herring taken along the shore was only about 50% as much as in the previous year.

"The outstanding feature of the year was the large catch of small mackerel which were in good demand for food fresh, and a large quantity were put into the freezers, and quite a quantity split that met with a ready sale."

*The Gloucester Fisheries.*

It is pleasing to note in connection with the story of the Gloucester fisheries year, again an increase in the landings. This year shows four million pounds ahead of the previous 12 months. Beside this, it can be said that Gloucester has had a good business fish year; that is to say from the amount of fish landed there has been noted an increase, gratifying to a great extent, in the shipments and market for salt fish throughout the country, put up in the attractive 1 pound to 40 pound packages. It is safe to say that the Gloucester shippers and curers, insisting upon quality products being landed at their wharves, are now reaping the benefits of that decision. Taking it all in all the fishing and business fish year has been an improvement over 1922, which year seems to mark the upward turning point following the unfortunate effects of the aftermath of the great World War.

Vessels of the Gloucester fleet marketing fish at other ports, in season, profited well. One of the greatest blessings that has been bestowed upon the city from a fishing standpoint was the wonderful catch of mackerel that happened in the late Fall of the year. These fish struck in and were caught in almost unparallel quantities and Gloucester profited accordingly. When the fresh fish market failed to absorb, as it did on many many occasions during this great mackerel rush, the only outlet for these capacity trips was to bring them to Gloucester, there to be split and salted on the wharves. It was the opportunity of decades and be it said to their credit Gloucester fish men took full opportunity thereof.

With splendid receipts during the summer fresh fishing season for ground-fish, all of which went to the splitters and curers, with Gloucester vessels profiting well in the fresh halibut industry, with the wonderful quick market for salt mackerel and a steady and constant demand for salted fish, it is not to be wondered at that the fish year in retrospect looked great as viewed through Gloucester spectacles.

The following table gives the landings of fish at this port from December 1, 1922 to November 30, 1923.

Salt Cod . . . . .	6,329,669
Fresh Cod . . . . .	17,849,325
Halibut . . . . .	234,251
Haddock . . . . .	10,293,592
Hake . . . . .	2,433,566
Fresh Cusk . . . . .	1,168,931
Salt Cusk . . . . .	27,423
Fresh Pollock . . . . .	3,378,848
Salt Pollock . . . . .	37,466
Salt Haddock . . . . .	150,160
Salt Hake . . . . .	27,423
Flitches . . . . .	4,388
Not product of American Fisheries . . . . .	8,189,618
	<hr/>
	50,124,660
Fresh mackerel (Pounds) . . . . .	5,310,489
Salt mackerel (Barreled) . . . . .	4,583
Fresh herring (Pounds) . . . . .	1,775,700
Salt herring (Barrels) . . . . .	3,760
Cured fish (Quintals) . . . . .	10,598
Bulk herring (Barrels) . . . . .	8,938

Total, December 1, 1922 to November 30, 1923, 62,104,199 pounds.

*SHORE FISHERIES.*

Owing to the necessity of curtailing the bulk and costs of annual reports the tables of statistics hitherto published yearly in the Appendix are omitted. The totals alone are given of the returns from the shore net and pound fisheries for 1923.

Number of men engaged, 359; number of boats, 262; value of boats, \$104,173.00; number of fish pounds, 126; value of fish pounds, \$188,650.00; number of nets, 482; value of nets, \$11,595.00; Catch in pounds, —

Alewives, 439,990  
Bluefish, 2,521  
Flounders, 178,537  
Mackerel, 4,148,594  
Menhaden, 295,336  
Pollock, 160,651  
Salmon, 31  
Seup, 111,716

Sea bass, 9,684  
Sea herring, 2,638,086  
Shad, 18,712  
Squeteague, 2,984  
Striped bass, 31  
Squid, 572,524  
Tautog, 12,654  
Other edible or bait species, 7,334,852

Total pounds, 15,926,903; total value, \$387,046.19.

#### THE LOBSTER FISHERY.

For some reason, as yet unknown and unexplained and without yet the opportunity to carefully study the serious question involved, the returns show that the lobster catch of this state for the year, after showing years of gradually increased catch, has presented a reversal of form; indeed, that the catch this year has been one of the smallest for a long time. Replies to the questionnaires sent to all parts of our coast show that of the 13 sections into which the coast is automatically divided, every section showed a decrease in catch but one. Experts in the lobster line up to the present date have been unable to give definite reasons for the serious falling off of catch and it seems that unless next year shows a return to normal it should be a matter for serious investigation. It follows as a natural sequence of short supply and large demand that prices aviated and while the fact of the serious shortage of catch should not be lost sight of, it is to be chronicled that the lobster fishermen turned in a fairly successful year because of advanced prices.

The totals of the tabulation of the returns of the year's fishing, required of the lobster men by law, follow. The complete tabulation, hitherto published in detail, is discontinued by reason of the necessity of curtailing printing expenses. The following data is compiled from reports received from the lobstermen, to and including Oct. 20, 1923.

Number of men engaged in the fishery, 648; number of boats, 824; value of boats, \$166,868.50; number of pots used, 42,569; value of pots, \$111,114.30; number of lobsters taken, 912,335; pounds of lobsters, 1,368,502; value of lobsters, \$433,349.69; number of egg-bearing lobsters taken and returned to the waters, 17,692.

As required by Chapter 130, Section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1923 was 1,142.

#### BOUNTIES ON SEALS.

The following towns were reimbursed by the Commonwealth for bounties paid on seals under Chap. 130, Gen. Laws, sec. 155; Barnstable, \$54; Cohasset, \$4; Duxbury, \$78; Essex, \$10; Framingham, \$2; Gloucester, \$6; Ipswich, \$2; Lynn, \$2; Newburyport, \$4; Plymouth, \$4; Provincetown, \$2; Revere, \$4; Rockport, \$2; Quincy, \$6; Rowley, \$6; Winthrop, \$2; Yarmouth, \$10. Fees to treasurers, \$49.50.

#### MOLLUSK FISHERIES.

It is difficult to arrive at conclusions or to secure definite figures of the catch in the absence of any central organization which would market and hence record the production, and because of the quantities taken for family use. A survey of the industry for the year was made in a general way through our wardens for office record. The information gathered shows the season of 1923 to have been, stated briefly, as follows:

##### *Clam.*

The production of clams in nearly all sections of the coast appears to have been average, and even much better in some localities.

The lease of the clam flats of Gloucester from the commonwealth to the city, under Ch. 710, Acts of 1912, was renewed for ten years.



*Scallop.*

The past year has witnessed little change in the scallop fishery. This year there was discovered in Buzzards Bay directly west of Meganset Harbor at North Falmouth, a fairly good bed of scallops, and the fishermen made the most of it. The 1922-1923 season as a whole averaged as only a fair year, conditions varying in different localities. In some sections a prosperous year is reported, while in others a decidedly poor one.

*Oyster.*

A fair season has been reported for the oyster industry, the severe winter and storms having had little or no effect on the beds. A fair set is reported at Wellfleet for the summer of 1923, while in other sections the set varies from either "very good" to "no set at all." The beds in general are said to be in good condition.

*Quahaugs.*

The quahaug fishery for the past season has in all instances been reported as prosperous wherever carried on. In all districts cold winter and storms had little or no effect on the fishery. Only a fair set is reported for the summer of 1923. On Cape Cod the quahaug beds are in excellent condition, while in other sections hardly fair. In every locality where quahaugs are taken they appeared during the past year higher priced than in previous years. A new bed of quahaugs in about 6 fathoms of water 2 miles to the west of Weepecket Islands was discovered, apparently covering a large area.

*Shellfish in Polluted Areas.*—Large sections of the coast are closed on account of the contamination of the shellfish beds,—including areas in New Bedford and Fairhaven, Lynn Harbor, Beverly, Danvers and Salem, Boston, and Cohasset.

The period for which the flats and waters of Boston Harbor and Cohasset Harbor had been closed for the taking of shellfish expired in the fall of 1923. On the request of the Department of Public Health under Section 137, Chapter 130, General Laws, this Division issued orders prohibiting the taking of oysters, clams, quahaugs and scallops in specified parts of Boston Harbor and its arms and tributaries, and in Cohasset Harbor, until such time as the Department of Public Health is satisfied that the contamination has ceased.

*SHAD.*

Resolve 40 of the year 1923 instructed the officials of this department to confer with the proper authorities of the State of Rhode Island, with a view to securing co-operative action designed to protect the shad fishery in Palmer's River. Report to be made to the General Court of 1924.

*ALEWIFE.*

Work for restoring the alewife fisheries consists of making provision for the passage of the fish; examination of obstructions and preliminary surveys of streams where unsatisfactory conditions prevail; and stocking experiments.

*Fishways.*

Attention was given during the spring run to conditions at existing fishways. (See "Fishways.")

*Surveys.*

Survey was made of the Jones River, Kingston, where several obstructions, and pollution, make adverse conditions for the alewives. Special attention was given to the first obstruction, the power dam of the town.

Records were made, for the office files, of the runs, catches, and sale prices, at the important alewife fishery sites.

*Stocking Experiments.*

This is the third season that mature alewives have been planted in the ponds at the headwaters of the Taunton River system,—the first year 2,698, the second 2,756, and this year 3,177. Each year there have been good numbers of

young seen in the ponds where the parent fish were placed. Weather conditions made the return of the young to the sea somewhat later than usual this fall, and even well into November large numbers of 4-7 inch alewives were seen in the ponds. According to the accepted belief as to the habits of this species, the offspring of the first year's planting should return to these ponds to spawn in the spring run of 1924.

During the spring, 1,725 mature alewives were transferred from nearby waters to the Ipswich River, as the first step in rehabilitating its fisheries.

For some years the passage of alewives between the sea and White Island Pond in East Wareham, by way of Red Brook, was prevented by the nine cranberry bog dams which lie between the lower end of the brook and the pond. This year the bog owners carried out a plan whereby, when the fish appeared in the spring in order to pass up into the pond to spawn, they were "locked" from dam to dam, and so up into the pond. Later in the year, when the schools of young alewives had collected at the pond's outlet seeking to pass down the brook to the sea, passageway through the dams was provided. If properly handled a small volume of water will insure the passage of large numbers of alewives. The above is an example of the possibilities of co-operation, so that all the possibilities on a given area may be developed.

Respectfully submitted,

WILLIAM C. ADAMS, *Director*.

## APPENDIX.

RECOMMENDATIONS TO BE CONTAINED IN THE FIFTY-EIGHTH ANNUAL REPORT OF  
THE DIVISION OF FISHERIES AND GAME FOR THE YEAR 1923.

The director respectfully recommends the passage of laws designed to accomplish the following purposes.

*Relative to Hunting and Fishing Licenses.* — The law should require a fishing license in all inland waters (in which Nantucket and all ponds now fished commercially under lease from the Director are excepted.) Under existing law, a license is not required to fish in inland waters which have not been stocked since January 1, 1910. It has been a physical impossibility to stock all of the inland waters in order to do away with this distinction. It, in effect, means that the waters most recently stocked are given protection, and that the waters which have not been stocked recently (and which presumably need it most) are left without any protection. This bill will also repeal Section 15 of Chapter 131 of the General Laws which calls for a publication of the list of stocked waters. By repealing this section we will be saved the expense of publishing this list annually, to say nothing of eliminating the work connected with it. We believe the sentiment in the State is — that all fishermen should pay their share of the freight. This law will also repeal Section 11 of Chapter 131 of the General Laws. This section provides for the issuance of duplicate licenses to replace lost licenses. In order to simplify bookkeeping, and to make license holders more cautious, the repeal of this section would require the licensee to purchase a new license. At present the loser of a license must make an affidavit as to the loss, sending it to the State House before obtaining a new license.

*Relative to the Date of Expiration of Lobster Licenses and to the Revocation of such Licenses.* — At present the lobster licenses expire on November thirtieth. All other licenses issued by this Division expire on December thirty-first and it is desirable to have all licenses expire on the same date to make the office records uniform. This bill also provides for the revocation of a license in the event of certain violations, with the effect of putting the violator out of business for a year from the date of conviction. As the law now stands, no license can be revoked unless the holder has been twice convicted of certain specific violations. If he is convicted of fishing without a license there is nothing to prevent him from obtaining a license and resuming his work. The change provides for the revocation of his license upon conviction of a violation of any of the lobster

laws, except that, in the matter of having short lobsters, conviction shall not result in such revocation unless — per cent of the lobsters shall consist of short lobsters. It also provides that upon conviction for fishing without a license — no license can be obtained within a year from the date of conviction. We believe that every lobster fisherman who honestly desires to maintain and build up his means of livelihood will see the reasonableness of these safeguards.

*Relative to damaging Property while Hunting, Trapping or Fishing.* — The great majority of hunters, trappers and fishermen want to obey the law and treat the other man's property with the same consideration which they would show to such property were it their own. A small class of bad actors is constantly stirring up ill-feeling between landowners and the public. We want to help to hold this class in subjection. Nothing (outside of a jail sentence) will be as effective as the revocation of the hunting or fishing license which would result from a conviction under this proposed law.

*Relative to Fishing in Inland Waters.* — The law should reduce the number of traps in winter fishing from ten to five to each fisherman. This is the only further legislative restriction on winter fishing we propose. We are still of the opinion that the present open season of winter fishing is too long and too deadly. But we have decided to watch the results of recently imposed restrictions to see if the benefits are sufficient before advocating more than the above.

*Investigation by a Special Commission relative to Public Hunting and Fishing Grounds and Game Refuges.* — It is desirable to create a commission of five members to consider the establishment of a public shooting ground; likewise a public fishing ground to be located on the banks of some river or stream and to report to the Legislature of 1925 its recommendations thereon. There is a great amount of waste land only partly suitable for reforestation which could be utilized for this purpose with no loss to agriculture. The same is true as to fishing grounds. But such a commission could study the project in all its phases and report on what should be done, if anything, to establish such public properties in this State.



B

The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1924

*Mass. : DEPARTMENT OF CONSERVATION : Division of  
fisheries and game.*



PUBLICATION OF THIS DOCUMENT APPROVED BY THE  
COMMISSION ON ADMINISTRATION AND FINANCE

JUN 13 1925

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## The Commonwealth of Massachusetts

The Director of Fisheries and Game herewith presents the fifty-ninth annual report.

### GENERAL CONSIDERATIONS

It has been remarked by more than one keen observer that the tendency of our modern life is toward increased leisure for our people. High-speed machinery, enormous, highly organized capacity for production, quickness of transportation and communication, and all the other phenomena of modern times, make to this end. How to instruct the people to employ this leisure time to the best advantage is a fascinating study. Experience has proved there is one field of activity available to all, the choice of which can be no mistake—the Big Outdoors.

All forms of recreational programs are beginning to make their appeal. The age-old pursuits of hunting and fishing have many competitors, — some of fairly recent origin. But the essential thing in turning our people into this most wholesome field of relaxation and enjoyment is to make the out-doors increasingly attractive. One of its greatest lures is our wild life in all its amazing variations. Practically every State, as well as the national government, has a division of activities devoted primarily to this objective, but in the light of our national history most of these institutions are comparatively new. Few citizens are so indifferent to the situation as to be unwilling to register the desire that this wild life be maintained and increased for the glorification of the countryside. In any great campaign for out-door recreation the groundwork lies in our forests and our wild life assets.

Previously we have discussed the considerations which must underlie any plan to permanently increase this wild life supply. There is one further proposition which should be advanced and emphatically stressed at this particular point in our conservation history — from the first awakening of our national conscience concerning the disappearance of our wild life, straight through to the present day, man has acted on the theory that the diminution could be checked and all species brought back by the simple expedient of restricting the population in the taking of the several species for food and of other species for various commercial purposes. It has taken us nearly 250 years of experience to realize the fallacy of this line of reasoning. We have come to realize that a far more deadly set of factors was at work than those represented by the rod and gun; we refer to the destroying influences known as the advancement of civilization. It is of little value to stay the hand of the sportsman or the fisherman, while at the same time the complete destruction of breeding and feeding grounds and the pollution of streams is permitted to appear, take firm hold, and expand. The destruction in a given locality by the rod and gun is a temporary phase. The destruction wrought by the wiping out of the producing areas is permanent. We have cut down our forests, ditched our swamps, drained our shallow marshes and lakes, turned into our streams the refuse from our mines and oil wells and all our chemical wastes, and yet we go on, fondly hoping that by simply forbidding man take these forms of wild life, we can, by some magic, bring back the stock. But the stock must have places to feed and breed, — it is so elementary that it is hard to believe we have overlooked



this consideration for a couple of hundred years. When once the reasonableness of this conclusion is fully understood and action taken as embodied in the permanent wild life sanctuary and the public fishing and shooting ground idea, we will have taken the first step toward a permanent guarantee that our wild life will be permitted to come back. It is a pleasant picture to contemplate the benefit to agriculture of the increase of insectivorous birds; the increased health-giving recreation of the sportsmen and fishermen through greater numbers of the sporting birds and quadrupeds, and the beautifying of the whole country through the presence of these as well as our song birds and the many unusual forms of harmless wild life, all of which could prosper in places now silent and barren.

#### PERSONNEL

There were no changes in personnel.

#### FINANCES

	Appropriations	Expenditures	Balances
For salaries and maintenance . . . . .	\$207,900 00	\$202,086 72	\$5,813 28
For special purposes . . . . .	4,800 00	4,060 85	739 15
Available from 1923 balances . . . . .	1,149 13	1,114 22	34 91
	<hr/>	<hr/>	<hr/>
	\$213,849 13	\$207,261 79	\$6,587 34
Balances available for the succeeding year . . . . .			723 75
			<hr/>
Returned to general treasury . . . . .			\$5,863 59

The revenue turned into the State Treasury was: for license fees (details below), \$184,478.35; sales at game farms and fish hatcheries, \$310.00; sales of game tags, \$23.85; sale of forfeited goods, \$479.00; lease of Chilmark Pond, \$75.00; lease of clam flats, \$10.00; sale of wardens' badges, \$1.75; rent of land and buildings at stations, \$192.00; total, \$185,569.95.

#### *Receipts in Detail of Licenses*

	Total Number issued	Gross Value	Fees to Clerks	Net Return to State
Combination licenses . . . . .	43,617	\$90,546 00	\$7,225 45	\$83,320 55
Hunting licenses . . . . .	41,336	58,641 25	8,269 40	50,371 85
Fishing licenses . . . . .	53,519	58,659 00	8,570 55	50,088 45
Lobster licenses . . . . .	820	820 00	123 00	697 00
	<hr/>	<hr/>	<hr/>	<hr/>
	139,292	\$208,666 25	\$24,188 40	\$184,477 85 <sup>1</sup>

This year's comparison of expenditures with revenue shows the percentage of operating costs met through income to have been 89.5% (compared with 38.8% in 1918; 42.3% in 1919; 49.3% in 1920; 56.2% in 1923; 81.8% in 1922; 92% in 1923). The foregoing figures show a falling off in the percentage to which the division was self-supporting as compared with the year 1923. This is due to two causes, — the first, the increase in the fees to city and town clerks from 15 cents to 25 cents taking effect July 24; the second, that owing to the curtailment of the shooting period due to the long drouth, fewer hunters took the field. The increased fee to the town clerks required the payment to them of \$3,294.60 more than would have been the case under the old rate.

There was a radical change in the forms of licenses and methods of keeping the records beginning this year. The financial savings thus effected are shown in the following:

	1923	1924	Savings in 1924
For printing and binding license forms; ex- press; labor for shipping licenses . . . . .	\$4,707 09	\$1,528 03	\$3,179 06

<sup>1</sup> There was also 50c. paid in due on 1923 account.

In addition to the actual financial savings, the change of method reduced the clerical work on this item at least 50%, with no lessening of the safeguards to the Commonwealth's interests. To produce further revenues it is planned to continue and extend the campaign for increasing the sale of licenses to the non-fishing and non-hunting public (which, though deriving enjoyment and benefit from seeing the wild life about, at present contributes nothing to its support). Recommendation is also made for a straight sporting license at \$2.25 in place of the present separate hunting, fishing and combination resident licenses; also for a corresponding increase in the non-resident licenses.

#### CONFERENCES

The annual conferences with the sportsmen, fishermen, land owners and others interested in wild life were held in December and January at Wareham, Leominster, Holyoke, Pittsfield and Boston.

On March 11, representative officials and sportsmen from all the New England States met in Boston to discuss the problems connected with migratory game birds. The most important feature of the meeting was the discussion, and endorsement, of the Federal Game Refuge — Public Shooting Grounds Bill pending in Congress, — the greatest piece of legislation for the protection of migratory birds which has ever come before the American public. The question of asking the Bureau of Biological Survey to change the present open season on wild fowl in our State (September 16 to December 31) to a new season (October 1 to January 15 inclusive), was discussed. Sentiment seemed equally divided as to the desirability of the change and the conference did not go on record either for or against it.

The Division co-operated with the Brookline Bird Club in effecting a federation of the bird clubs of New England. This move had the object of uniting all the bird clubs into a solid working organization, making a powerful body to act under a central and directing head, capable of important accomplishments, rather than isolated and practically futile units diffusing their efforts in many directions.

In October a series of conferences was held with representatives of the Fishermen's Union of the Atlantic with a view to establishing a system of co-operative marketing of the product. The matter is still in preliminary stages.

In October representatives of the Division met with the representatives of the shore towns to consider more satisfactory methods of handling shellfish problems. (See Mollusk Fisheries).

#### ACTIVITIES OUTSIDE THE STATE

It is noticeable at this time how many nation-wide movements are in progress dealing with conservation problems. It behooves the states to work shoulder to shoulder on these larger problems, for what injures or benefits the whole injures or benefits every part. Such are the Federal Game Refuge — Public Shooting Grounds Bill before Congress; the adoption of a nation-wide out-door recreation policy; the establishment of a wild life foundation for the study of the problems of wild life conservation, as, for example, the diseases to which wild game is subject and of which practically nothing is known; the move for the protection of the prong-horned antelope; and the establishment of the Upper Mississippi Bottoms as a wild life refuge.

In connection with these, or similar problems, the Director has attended the following meetings:

Annual meeting of the American Game Breeders' Association in New York December 10 and 11, 1923 — the annual gathering of the game breeders of the country.

The meeting of the Advisory Board to the Department of Agriculture on the Migratory Bird Treaty Act in Washington on December 13.

The meeting of federal and state officials, representatives of national associations and individuals in Washington, D. C., on December 14, to consider the establishment of an antelope reservation in southeastern Oregon.

Hearing before the House Committee on Agriculture on the Game Refuge — Public Shooting Grounds Bill, March 29.



Meeting in Washington, D. C., on May 22-24, of the Committee on Outdoor Recreation, appointed by President Coolidge. Director Adams represented the Commonwealth, the International Association of Game, Fish and Conservation Commissioners, and the American Game Protective and Propagation Association. The object was to promulgate a national outdoor recreation policy which should not merely co-ordinate under federal guidance all activities in behalf of outdoor recreation, but also formulate a program to serve as a guide for future action. This is the most important step looking to the tying-in of all conservation work in the interests of the nation, that has been taken in the history of the country. The educational value will be enormous, and the resulting teamwork exactly what is needed.

American Fisheries Society, September 8-9 and International Association of Game, Fish and Conservation Commissioners at Quebec, being the annual gathering of the conservation officials of the country.

#### COURTESIES

Acknowledgment is made, with sincere appreciation, of the helpfulness and co-operation received in this, as in other years, from an increasing number of persons and organizations.

#### ENFORCEMENT OF LAWS

The personnel of the law-enforcement organization remained the same except for the resignation of Warden William E. Wheeler of Falmouth, on April 1, and the appointment of Gordon E. Spofford of Newbury as his successor.

An effort was made to obtain more local co-operation in the enforcement of the fish and game laws, by requesting each city and town to take advantage of a long-existing law and appoint a local fish and game warden to assist the regular warden. While 75 cities and towns have taken such action, it is disappointing that more do not appreciate the value of the plan.

Five new Ford touring cars were added to the equipment, making 19 cars in use in the law-enforcement work. Though this is favorable progress the maximum results of motorization cannot be obtained until all wardens are equipped with state-owned cars. In no other way can the "rubber-tired" violator of today be apprehended.

As has been the practice for the past few years, the wardens have been employed considerably on other phases of the divisional activities because of insufficient men to carry on the hatchery and salvage operations. Despite this fact, there is an increase in the number of court cases handled, due somewhat to the increase in the number of hunters and fishermen afield, but more particularly to more efficient enforcement methods and a better degree of co-operation on the part of the sportsmen, nature lovers and police organizations.

Of the enforcement agencies, the State Department of Public Safety probably rendered the greatest service to the work through the medium of the State Police Patrol and the use of their boat; but the co-operation from local police departments, and many other agencies, is worthy of more than passing notice.

A determined effort was made to co-operate with the farmers and land owners to curb the lawless minority of the hunters and fishermen who refuse to respect the rights and privileges of the land-owners and do more or less damage to their property. Though there is a lack of sufficient authority in law to enable the wardens to cope with this situation, considerable good has been accomplished through their watchfulness for such violations and a prompt report of the facts to the proper authorities.

The enactment, in 1923, of a migratory bird law corresponding with the Federal Migratory Bird Treaty Act in its principal aspects reduced materially the number of violations with respect to migratory birds which were reported to the U. S. Game Warden for this district, for the reason that such matters can now be handled in the State courts and a more prompt disposition effected.



The court work for the year was as follows:

Number of cases, 716; convicted, 688; discharged, 28; (filed 122, appealed 26); fines imposed, \$8,800; costs paid, \$253.

Licenses revoked: resident combination, 80; resident hunting and trapping, 47; resident fishing, 51; non-resident fishing, 4; alien hunting and trapping, 1; alien fishing, 5; minor trapper, 1; total, 189.

Again an increase is noted in the number of cases presented to the courts by wardens of this Division, due to fuller motorization, together with co-operation from courts, police officials and citizens which is bringing about a better standard of law-enforcement.

The charge of fishing without a license leads in the list of convictions with a record of 170 cases, netting \$1,363 in fines. The companion charge of hunting without a license shows 77 cases and fines of \$678, indicating that the provision of law requiring a fishing license is less generally understood.

It is evident that hunters go afield without being able to identify the birds which may be legally hunted and killed, as 41 persons were prosecuted in the courts for killing protected shore birds and fined \$610. In the majority of cases the defense was mistaken identity, which as a matter of fact is no defense whatever.

The influence of public opinion is shown in no better way than in the decrease of prosecutions for hunting on Sunday, as only 22 cases were entered with fines of \$180, as contrasted with 1921 when there were 61 cases and fines of \$410. Public opinion frowns upon the practice of Sunday hunting, and its influence is noted above.

Twenty-nine aliens were haled before the courts and fined \$1,245 for illegal possession of firearms, which were confiscated as well. The problem of curtailing the activities of some of our alien population is further indicated by the prosecution of 30 cases for the killing of protected birds, mostly song and insectivorous species, of which the majority were cases against foreign-born residents.

It is noteworthy that during the temporary closed season of three and one-half weeks, due to extreme drouth, only 34 violations of the Governor's proclamation were brought to court. This indicates that as a whole the fraternity met the situation unselfishly and with commendable sportsmanship.

Violations of the lobster laws continue to present a vexing problem, particularly the taking and selling of short lobsters. Eleven such cases were prosecuted, and fines assessed totalling \$1,064. Again it may be remarked that public opinion plays an important part in the enforcement of law, but in this case it is regrettable that the desire of our citizens for these illegal lobsters provides the incentive for violations on the part of the fishermen. If the far-reaching effect of the purchase of these "shorts" was considered fully, many people would change their attitude on this form of so-called economy.

#### LEGISLATION

Laws to accomplish the following purposes were enacted by the General Court of 1924:—

Chapter 96, to make lobster licenses expire December 31 of each year.

Chapter 97, to extend the term of certain fishing rights in the New Mattakeesett Creeks, Great Pond, Edgartown.

Chapter 104, providing for the protection of the shad fishery in Palmer River.

Chapter 130, requiring a license for the possession of a ferret.

Chapter 184, relative to the right of wardens to search for fish and game.

Chapter 191, providing that areas in great ponds may be set aside as protected spawning grounds.

Chapter 211, establishing a board for the issuance of permits to kill ruffed grouse which damage fruit trees.

Chapter 240, to prevent defilement of certain water supplies by gulls and terns.

Chapter 325, increasing fees to city and town clerks for issuing hunting and fishing licenses.

Chapter 477, establishing Penikese Island as a refuge for wild birds.

The recommendations made to the General Court of 1925 will be found in the Appendix.

## EDUCATION AND PUBLICITY

The greater part of the publicity and educational work was effected through the medium of stereopticon and moving picture lectures given by members of the staff before sportsmen's associations, clubs, schools and similar organizations. A fair idea of the scope of this work may be gathered from the fact that the Chief Warden gave fifty-one lectures and travelled approximately 4,000 miles for this purpose, to say nothing of the work of the Director and other members of the Division along this line. Considerable interest in the work of the Division is evidenced by the large attendance at these lectures. This work appears to be particularly effective among the school children.

At the Eastern States Exposition, held at Springfield during the week of September 14, an exhibition consisting of 13 tanks of live fish, and other educational features, was shown in the divisional quarters in the Massachusetts State Building, and was visited by many thousand people. There was no exhibition work at any other of the agricultural fairs.

## BIOLOGICAL DEPARTMENT

The year's activities covered much the same ground as in 1923, and were divided among research work, field work, and the handling of general biological and distribution problems.

Specimens of fish and game received from various sources were autopsied and routine pathological examinations made; inquiries were handled on miscellaneous biological subjects; problems in the field were investigated, including those arising at the fish hatcheries and game farms; pond surveys made to ascertain the proper species for use in stocking; fishways and streams surveyed and studied biologically. Statistics were compiled and a complete record is available of all ponds of twenty acres and over (excluding water supplies and private reservoirs) which have never been stocked. It is the aim of the Division to concentrate on stocking these ponds with suitable species of fish. As time permits, the streams will be similarly checked up. Much time has been spent in classifying and grading the bass ponds, but with the number of factors which enter into such a classification, progress was limited.

Detailed information and statistics were collected on the commercial shellfish. (See "Mollusk Fisheries.") The annual survey of the alewife industry was made, fishways installed (see "Alewife" and "Fishways") and observations made on the expected return of alewives to the streams where stock has been planted.

A great deal of the year's work centered on distributing the stock raised at the hatcheries and game farms, considerable thought being given it from both a biological viewpoint and that of economy and the systematic and efficient handling of the stock. (See "Fish and Game Distribution.")

## WILD BIRDS AND ANIMALS

The first gift under the law which permits the acceptance of bequests for the benefit of wild life, is the Nye Homestead in Sandwich, given by Ray Nye of Sheboygan, Wis. The land, which is valuable for fish and game propagation, lies adjacent to the East Sandwich Fish Hatchery, and comprises the land on which the East Sandwich Bird Farm is located. The house, a fine type of old Cape Cod homestead, will be restored and marked with a tablet commemorating the gift.

There are great possibilities in the new law, and it is to be hoped that as time goes on, increasing advantage will be taken of it, for the wild life of this Commonwealth will never be adequately protected until there is a sufficient number of permanent wild fowl sanctuaries located at strategic points in the State, on which the killing of all forms, except vermin, will be prohibited forever.

## WINTER FEEDING

The winter of 1923-24 being on the whole an open one, the wild stock required little feeding. Grain (1,400 lbs.) was distributed to be held for use as emergency



rations, and the Division stood ready to take necessary measures if need arose. An attempt to start Japanese crab apple for planting as a food supply for the wild birds was unsuccessful, the seeds failing to germinate.

### BREEDING SEASON

The spring was wet and cold, which had a tendency to make the breeding season late; but during the time of the development of the young birds the weather was favorable, and satisfactory numbers of broods of young of all species were reported.

### FIRES

Abnormally dry conditions through the summer and fall increased the fire hazard and led to curtailment of the open season on game (for which, see "Upland Game").

### POSTED LAND

The practice of posting land is being followed to a less extent than formerly. This is due to quite an extent to a better understanding between the land owners and the sportsmen and fishermen, who are beginning to understand more fully that if the American system of free shooting and fishing is to be maintained, greater consideration must be given to the owners of the land. To this end a number of the sportsmen's associations offered a reward for information leading to arrest and conviction of persons doing damage to property while hunting and fishing. This is constructive work of the right kind, and is sure to bring the desired results in all localities where the sportsmen take the initiative in proving to the land owners their willingness to assume increasing responsibility for the conduct of that class of our citizens when they go on the land or waters.

### MIGRATORY BIRDS

Permits were issued to 80 persons for the collection of birds, eggs and nests for scientific purposes. Seventy-three reports were made, showing 235 birds and 567 eggs had been taken. There were 270 bird banding permits issued to persons co-operating with the U. S. Biological Survey in their studies in bird migration.

#### *Migratory Game Birds*

*Shore Birds.* — It is becoming increasingly evident that the shore birds are not holding their own. There has been a noticeable increase in some of the smaller species, but the larger species do not show satisfactory numerical growth. For some years there has been a noticeably heavier flight on the spring migration, and it is obvious that they must return by a different course, for they are not seen on our coast in the fall in comparable numbers.

*Plover.* — The spring flight of black-breasted plover was normal. During the return flight the birds came along in smaller numbers, more evenly distributed over the flight period than usual. Numbers had passed by before the opening of the season, and comparatively few were killed during the early days of shooting. The general impression prevails that these birds, at least in their movements along our shore, are showing no signs of increase, and are not holding their own.

Upland plover bred in this State over a substantial area and were present in numbers corresponding to the last year's record.

The same may be said of killdeer and piping plover.

*Snipe.* — There was a good spring migration of snipe. Comparatively few were taken during the fall, because, owing to the abnormal weather conditions, many of the good snipe grounds were dry and unfavorable.

*Woodcock.* — The spring migration brought the usual number of birds, based on the observations of the past few years, and over all parts of the State the indications are that they bred in about usual numbers. The fall migration was more "spotty" than common. A good flight was reported down the Connecticut Valley region, but in other sections of the State, due undoubtedly to the dry season, very few woodcock were seen or killed. Such extraordinary conditions have pre-



ailed the past two or three years during the fall migration that it is not safe to base conclusions on the showing of woodcock during these times, but the general impression prevails that they are holding their own, though not showing the desired increase.

*Rail.* — The spring migration was normal. The unusually dry periods of the summer and fall restricted their breeding area, but the birds were here in usual numbers.

*Sandpipers.* — The spring and fall migrations were favorable, and all of the smaller species seem to be increasing.

*Winter and Summer Yellow Legs.* — There was a good flight on the spring migration. The fall migration did not materialize with the usual numbers. The birds of both species seem to be slackening off to such an extent as to raise a question whether or not they are maintaining their numbers.

*Curlew.* — The indications are that the curlew is slightly on the increase. More scattered birds of the various species are being reported from year to year.

*Wild Fowl.* — The spring migration appeared to be normal. The fall migration this year, as last, was undoubtedly affected by the unusually dry and mild season. The impression prevails that the pond fowl, so-called, are coming to their natural stopping places in fewer numbers — whether it is due to the lack of food or the increasing disturbance of the birds on their resting grounds.

*Ducks.* — The wood duck is increasing and is gradually extending its range in the State.

The mallard duck is reported only occasionally. The spring flight of red-heads had no unusual features. During the early part of the fall migration the birds appeared in good numbers, but owing to a quick and short freeze-up many of the birds continued on.

The number of breeding black ducks throughout the State shows a steady increase. They were reported in increasing numbers in almost every locality during the period preceding the open season. While the kill was restricted by reason of a curtailed shooting period, owing to drouth conditions, the reports showed black ducks to be here in steadily increasing numbers.

A few scattering canvasbacks were reported on the fall migration.

The spring flight of blue bills was of ordinary proportions. All through the fall they were reported moving along in a rather early migration, and in more than usual numbers.

The spring migration of the scoters was normal, and the fall flight heavier than usual.

*Geese.* — In so far as the shooting period is concerned the geese were very late in arriving, a rather heavy flight occurring during the last few days of January.

The spring migration was in no respect unusual. During the past fall geese were reported moving southward at an unusually early date and have kept drifting along ever since, but altogether making a light flight. This may be due somewhat to mild weather and the drouth period.

*Brant.* — The spring flight of brant was rather light. The birds were later than usual in coming down, the first appearing in the areas adjacent to Tuckernuck around the first of November, increasing slowly in numbers until it is estimated that a thousand had collected by the early part of December.

*Statistics of the Gunning Stands.* — Number of stands operated, 95; geese shot, 3,319; ducks shot, 7,827; live goose decoys used, 3,596; wooden goose decoys used, 3,172; live duck decoys used, 4,313; wooden duck decoys used, 2,759.

### *Migratory non-game Birds — Gulls and Terns*

With no adequate appropriation for the work the colonies of breeding gulls and terns are not receiving needed protection. The most the Division could do was to station a caretaker during June and July at the breeding ground at Monomoy Point, Chatham, where vermin had accumulated in large numbers. During the two months the caretaker destroyed 23 skunks, 10 wild beach cats, 5 very large rats, and 2 four-foot water snakes. Motor boat parties were prevented from entering on the colony and disturbing the birds.

The Point is so changed that the terns nested on much higher ground above reach of even an extra-high tide. There was plenty of live bait, the young hatched fast, and the season's hatch appeared to be above the average. Six nests of the large gray gull were found on the southeast point, and the oldest natives claim this is the first time they have nested on the Point.

With the rapid building-up of shore property the sea-birds are being driven from their breeding grounds, and the need for setting aside suitable locations for their occupation is evident. The first of what is hoped will be a series of sea-bird sanctuaries, was acquired this year, when the Legislature turned over the island of Penikese to this Division to be held as a bird reservation for all time. (See "Reservations.") It is an important breeding ground of gulls and terns. Efforts are being directed towards the acquisition of certain other natural breeding locations. The newly-formed Federation of the Bird Clubs of New England has undertaken to raise a fund to make possible an intensive study of conditions at all the known sea-bird colonies on the New England coast by a competent ornithologist, with recommendations, the latter to serve as a basis for protective measures to be taken by the State.

#### *Federal Control of Migratory Birds*

The Game Refuge — Public Shooting Grounds Bill, so-called, was introduced into the Sixty-eighth Congress in a new draft (H. R. 745 and S. 2,754), and has been favorably reported by both Senate and House committees. A great amount of work was done by this Division to enlighten the sportsmen, through the fish and game clubs, as to the purpose and value of this bill, and to make plain to the Congressmen the need of such legislation, — under the firm conviction that a measure of this sort is the only salvation of the wild life.

#### UPLAND GAME

##### *The Hunting Season*

The last three hunting seasons have been marked by lack of rainfall, so that the tinder-like dryness of the woods and fields made it necessary to close the hunting season to better control the forest fires. This year, after about one week of open season on upland game, the existence of 243 fires in the State caused His Excellency to suspend hunting of all kinds indefinitely, beginning at sunset on October 29. During the preceding 21 days not enough rain had fallen to be measured, and there was no prospect of rain. Similar action was taken in New Hampshire, Connecticut and New York. The drouth was broken November 22 and 23 with drenching rains, and the season was opened by proclamation from November 24 to November 29. While the foregoing arrangement resulted in only one-half of the usual amount of open season on upland game, it was generally conceded desirable by reason of the reported scarcity of grouse. The Governor had no authority to except any species, hence the season was closed on wild fowl as well as upland game. It takes a season of extraordinary conditions such as those of this year to test out existing machinery to cope with it. This experience confirms our contention of many years that either the Governor or the Commissioner of Conservation should be empowered to make, in a given year, such readjustments of the open season as will make possible the maximum amount of hunting consistent with the protection of the forests and of the game supply, when drouth or other extraordinary conditions call for such action.

*Pheasants.* — Pheasants wintered well, there was less necessity for winter feeding, and they reached the breeding season unhandicapped. There was no marked increase in their numbers, with local exceptions, but the average of breeding stock is maintained quite consistently from year to year. A preponderance of females is reported; but, after all, considering the polygamous nature of the birds, this seems a proper condition. A special point is being made, so far as resources permit, to place cocks in localities where hen pheasants with no male birds at all, come to our notice.

There was an excellent showing of young in the spring.



The closing of the hunting season on account of the extremely dry conditions put an end to the pheasant shooting after the first eight open days, during which 1,024 pheasants were reported having been killed. After the season was re-opened (November 24 to 29 inclusive), there were 399 pheasants taken, a total of 1,423 for the open season, divided by counties as follows: Barnstable, 7; Berkshire, 23; Bristol, 137; Essex, 174; Franklin, 27; Hampden, 122; Hampshire, 142; Middlesex, 303; Norfolk, 104; Plymouth, 121; Worcester, 262; locality not reported, 1; total, 1,423.

*Ruffed Grouse.* — Winter presented no unusual features, and the grouse, of which there were good numbers left over from the previous year, came through well. A normal number of breeders were in the covers, — in many sections far more than usual. Though the late spring delayed hatching by a couple of weeks, the conditions in the growing period were favorable on the whole, and the production was good. Throughout the summer and up to the opening of the hunting season the birds of this year's hatch were apparently numerous.

But with the beginning of the hunters' search for the grouse at the opening of the season, an alarming scarcity became apparent. At that time field conditions were very unfavorable. The weather was mild, the woods were very dry and noisy, with much foliage still on the trees, and the birds were very wild and difficult to approach. Reliable covers failed to disclose the expected birds, and in other cases where birds were found, it was in localities which had not harbored birds for years. It was the common experience of the sportsmen that the birds were not to be found. An appeal was sent to the sportsmen to refrain from shooting what few remained, and to send to the central office at the close of the season, their observations, as a basis for action. But after eight days of hunting the Governor's proclamation stopped all shooting and the season was re-opened only for the period November 24-29 inclusive.

A final consideration of all the facts connected with the scarcity of the grouse leads to the belief that it is only a seeming scarcity, due to the fact that the weather conditions, coupled with the abundance of foliage, had scattered the birds and forced them into leaving their usual covers to take refuge in the swamps and thickets. It may well be the case that when the cold weather and the exhaustion of food supplies (which this year were plentiful in the fall to a very unusual degree) drive the grouse later on into the runs, the situation may be less serious than appeared at first sight. When all returns are in and the facts known, recommendation will be made to the Legislature for one year of closed season if such appears necessary, to allow the grouse to become re-established.

*Quail.* — Over the natural quail range the quail came through the winter in excellent condition, the ground having been bare practically all winter and temperatures generally mild. The breeding season opened with a larger brood stock than usual, weather conditions were favorable, mated birds could be heard calling in new places, and many broods of young were seen.

When the open season arrived conditions were good, and there were large covies in the Cape district. The quail shooting period — as was true of all upland species — was limited to about two weeks by reason of the closing of the season on account of drouth.

In the closed counties (Dukes, Essex, Hampden, Hampshire, Middlesex, Nantucket, Norfolk and Worcester), the conditions have changed but little, if at all. While some counties may have half a dozen bevs they do not increase and it is noticeable that few, if any, young are reported. The one exception to this is in Dukes County. There the quail have continued to increase as mentioned in previous reports, — so much so as to justify an open season when the present closed period expires on October 20, 1925.

*Deer.* — Figures for the open season on deer coming within the period of this report (December 3-8, 1923) are 1,172 deer killed (683 bucks and 489 does), — 409 less than the preceding season. They were divided as to county as follows: Barnstable, 116; Berkshire, 210; Bristol, 36; Essex, 7; Franklin, 244; Hampden, 115; Hampshire, 116; Middlesex, 19; Norfolk, 7; Plymouth, 124; Worcester, 178.



The decreased kill indicates nothing more serious than less favorable hunting conditions. It was generally reported that deer were very numerous before the opening of the season, and there were more pre-season violations than commonly. The season opened sunny and mild, covers and brush dry, and no snow on the ground, precluding tracking. The absence of snow, a couple of rainy days, and the fact that the deer were well scattered, made the capture of one somewhat a matter of luck and will account for the fewer numbers killed. The number of hunters was large, there were but few violations by the use of dogs or rifles, and many deer were left over.

There was a good increase during the breeding season of 1924; throughout the year fawns and young were commonly seen, and over the State as a whole the numbers seem to be well up to normal.

Deer shot while damaging crops numbered 73; and towns were reimbursed by the Commonwealth for claims paid for damage by deer to the amount of \$4,753.25.

*Moose.* — These animals seem to be holding their own. The most are seen in Washington, Becket and Otis, and are spreading out to other sections, having been seen in Ashfield in Franklin County, and below Westfield near the Connecticut-Massachusetts line.

*Squirrels.* — There are only a few sections in the State which report any increase, or even a normal number of gray squirrels. In most parts a growing scarcity is reported. With the disappearance of their food supplies through the killing off of the chestnut trees by blight, it is to be concluded that there is little prospect of their re-establishment unless conditions once more become suitable for their existence.

*Hares and Rabbits.* — The number of hares and rabbits reported indicates a "spotty" condition. In many localities they are reported as fairly plentiful, and in many others they are almost wiped out. This is particularly true of the white hare. Reports from fish and game clubs indicate that white hares purchased and liberated have almost entirely disappeared between the time of liberation and the beginning of breeding time.

While most species can stage a quick recovery from unfavorable conditions, there is urgent need, particularly with respect to the white hare, for several permanent sanctuaries in which hares can be trapped up for restocking purposes. At present we are dependent on hares imported from other states to keep up the supply. Should adverse legislation in these localities prevent these importations, it would seriously cripple our efforts to keep the remnant of the white hare country reasonably well stocked.

*Fur-bearing Animals.* — While all the fur-bearers except the fox are now protected by some closed season, nevertheless the high prices obtained by trappers for all furs has so intensified their capture, that a great concern has arisen over the future of the muskrat. These animals have been reduced to the point of extinction in many sections, and in others the supply is so low as to cause alarm. The Division is recommending a closed season on muskrats for two years, subject, of course, to the right of the property owner to protect his holdings. It is interesting to note the recent increase in the price for weasel skins, which may result in more systematic trapping of these animals, which is highly desirable. We again stress the point that the fur-bearing animals are a State asset, and as such should be handled on a strictly business basis. The seasons should be sufficiently long to give the trappers a reasonable opportunity to take fur, but they should be so carefully regulated as to insure the taking only of prime skins.

There appears to be little prospect of obtaining any protection to the fox during the breeding season, but even without it the fox seems to be holding its own. Six fox stomachs were examined during the year, but no content was found that would indicate damage to the game stock.

The reports by trappers of their catch in 1924 show: number of reports, 483; muskrat, 6,603; mink, 766; skunk, 3,139; fox, 1,097; raccoon, 295; squirrel, 45; weasel, 153; otter, 21; total, 11,921.

## ENEMIES TO GAME

On complaint of alleged destruction of trout by black-crowned night herons along the Mashpee River, the U. S. Biological Survey was asked by this Division to investigate. Summarized, the report of their agent states that no sign of trout was found in the stomachs of 35 night herons collected along the Mashpee River during the latter part of July, 1924. No trout were found in the stomachs of night herons in Massachusetts except when the birds had been feeding at a trout rearing pond, where young trout were present in a far greater abundance than ever occurs in nature. There was no evidence to show that the black-crowned night herons in Massachusetts ever catch trout except where the fish are confined in large numbers, as in hatchery rearing ponds.

*Cat.* — Nothing new can be said with reference to the problem of the wild hunting house-cat. We can only reiterate previous assertions that this undoubtedly constitutes the deadliest menace to small game that exists today. There is no check on their increase, except the wardens and the sportsmen who are alive to their destructiveness, and race suicide among them is unknown. Unquestionably a semi-wild hunting house-cat destroys as much game as a lynx or wild-cat, for they must, and do, eat every day, and it is a fact that all such cats which are shot are found to be large and well-nourished.

Bounties of \$5 each were paid on 65 wild-cats (Canada lynx or loup-cervier) under Section 90, Chapter 131, General Laws.

During the year the stomachs of 3 wild-cats were examined, but nothing in them indicated damage to our upland game. Examinations were made on December 22, 1923 and February 6, 1924, respectively.

*Hawks and Owls.* — About usual numbers of hawks and owls were seen, and no new problems have presented themselves.

*Starlings.* — Starlings continue to increase, since there is absolutely no check on them. The flocks are gaining in size, and flocks of from 1,000 to 5,000 are not uncommon. Opinions are divided as to their destructiveness.

## RESERVATIONS

*Martha's Vineyard Reservation*

After the survey of the conditions at the heath hen reservation and the results of the work, as set forth in the last report, it was decided to continue on the same lines for a time. Therefore the first part of the fiscal year was devoted to the usual work of bird-feeding, keeping poachers off the reservation, and destruction of vermin. There were 19 cats, 22 hawks and 186 barn rats destroyed.

In the spring new plans for conducting the reservation were formulated, pursuant to which the greater part of the farming operations were abandoned, the live stock sold, and the station force reduced to the caretaker only. The new plan restricts the work to —

Guarding the reservation against illegal hunting.

Destruction of vermin.

Keeping close check on the heath hens frequenting the reservation.

Assisting in scientific investigations.

Keeping closer watch over the heath hens in other parts of the island.

Careful winter feeding of the heath hens not on the reservation.

The above policy was adopted primarily for the purpose of freeing the superintendent from the routine of farm work so that closer care and supervision could be given to the heath hen. It is significant that more birds have been noted off the reservation than on it during the past years when the area was extensively farmed to produce growing crops for them. It has been found that the heath hen will readily eat corn on the cob. It is our plan to turn over and plant each spring some portion of the area for a supply of green food. On the other hand, it is noticed that the birds find natural green food to their liking as early as any cultivated green food can be produced. The former policy of raising corn and letting it stand on the stalk through the winter, was an expensive operation. It also had



the effect of attracting to the reservation large numbers of rats, and seemed no more to attract the heath hens than do the ears of corn dropped on their natural feeding ground. There is an abundance of all kinds of food available for the heath hen on the island, and it does not appear that the problem of the heath hen is in any way tied in with the question of an adequate food supply.

The lease of the Cromwell property, expiring in June, was not renewed. Negotiations are pending for its purchase by the Forestry Division of the Department of Conservation.

The usual number of visitors came to the reservation to see the heath hens. No fires occurred. A few more heath hens were noted this spring than last, all told about 60 birds in various parts of the island. During June, two broods were seen on the reservation, and two other broods reported. The early part of the summer was damp and cold, a rather poor season for rearing of upland birds. Five male heath hens were captured and killed and sent to Professor Gross of Bowdoin College, Brunswick, Maine, who is making a biological study of the heath hen. His report follows:

"There has been a recent revival of interest in the heath hen, resulting from a questionnaire sent out by William C. Adams, Director of the Division of Fisheries and Game in February of 1923. The primary object of this questionnaire was to test public opinion as to the advisability of the State continuing the reservation on Martha's Vineyard at an expense of nearly \$4,000.00 per annum. The response to the questionnaire was greatly in favor of exerting all reasonable efforts in saving the heath hen. The members of the Nuttall Club of Cambridge and the Brookline Bird Club of Brookline made recommendations to the director that a life history study be undertaken and also an investigation be made of the conditions which govern the existence of the birds on the island, in order that some definite proposal could be offered which might be an aid in saving this bird, or at least in prolonging its existence. Dr. John C. Phillips took the initiative in causing this study to be made, and he, with the assistance of Thomas Barbour, J. E. Thayer, C. A. Mackey, W. P. Wharton, C. F. Bachelder, A. Hemenway, W. M. Tyler and F. A. Foster provided the means necessary for its execution. This study was begun on April 9, 1923, and was continued until the latter part of July. A visit was made in November, 1923, and others in March and April, 1924. Visits will be made for at least another year when the final report on the heath hen will be published.

"To those who have not followed the status of the heath hen it will be of interest to know that since the Commission on Fisheries and Game, now Division of Fisheries and Game, established the heath hen reservation in 1908, the bird has been subject to great fluctuations in numbers. For a few years it thrived under the added protection and care, and by the spring of 1916 the numbers, according to a census made by Mr. E. H. Forbush, had increased from 55 to 800, and Mr. William Day, then superintendent of the reservation, estimated that there were not less than 2,000 birds. In May of the same year a destructive fire swept over the island which not only killed many nesting females but also destroyed much of their cover and food supply. The subsequent appearance of many hawks further aided in reducing the numbers, so that in the following year less than 150 birds remained. For the three following years the heath hen seemed to rally from this catastrophe by a steady increase which reached a maximum of 600 birds in 1920, according to an estimate made by Mr. Allan Keniston, the present superintendent of the reservation. The following year the number of birds seen was 314; in 1922, 117 were counted; and in the year 1923 the usual census revealed only 28 birds (Mr. Keniston accounted for a few more later in the season). It is probable the personal factor is very important in the above counts and some of the estimates in past years may have been larger than the facts warranted. Nevertheless it is evident there has been an irregular but marked decrease in the number of birds since they reached their recent maximum in 1916. The cause of this decrease is not due to the lack of interest or to any neglect on the part of the State department.

"One of the facts brought out early in the present study was the existence of an extreme excess number of males. All of the birds observed on the reservation



fields in the spring of 1923 were males, but females may have been present in the vicinity which never appeared on the fields to feed. All efforts to find females in the spring failed, but two females with small broods of young were noted during the summer in places remote from the reservation. When this abnormal relation in the numbers of the sexes was realized recommendations were made to isolate the male birds, and later, when we were assured that our policy was correct, these males were taken for scientific study. Those in charge of the work expect to continue this program until the ratio of the sexes has been more nearly adjusted. Not more than 5 males have been taken in any one year, as a radical change might prove a detriment rather than a help to the colony. Meanwhile we are carefully noting the effects of this gradual adjustment. It is very gratifying to know that whereas the author could not account for more than 28 birds in 1923, a census last April (1924), under the same circumstances revealed a count of 54 birds. These birds, as in the spring of 1923, were distributed in several distinct groups, and while the increase was more or less general in all groups, the most marked increase was on the reservation where the numbers increased from 12 to 20 birds. Five males of the 12 included in the 1923 count were taken, so the increase was actually 13 birds on the reservation. That these additions did not come largely from other parts of the island is evidenced by the fact that the other flocks either maintained or increased their numbers. Three of the 20 birds noted above were females. The author is not ready to state that the increase in the numbers on the reservation is due to the elimination of a part of the excess males, but he is convinced that it is at least an important factor. The details of this problem will be discussed in the final report. During the past summer (1924), Mr. Keniston has reported several broods including one of 10 young, hence we have hopes that the census to be taken in April, 1925, will show a substantial increase over the number seen in April, 1924.

"A study of the food of the birds and a general survey of the conditions on the reservation seemed to warrant the recommendations made on April 19, 1924, that the meadows be continued, hiring assistance to plow under and replant when necessary, but that expensive farming operations as carried on in the past, involving the hiring of an assistant and the maintenance of horses and farm machinery, be discontinued. Since the reduction of expenses is necessary this change and the giving up of the Cromwell lease seems the best way to accomplish this end without seriously affecting the welfare of the heath hen. Instead of attempting to raise corn, sunflowers, and other foods, that these be purchased and distributed to the birds during times when their native foods are scarce or inaccessible because of snow and ice. In mild winters like that of 1923-24, very little food need be provided. During the winter of 1923-24 the heath hens never visited the fields of corn and buckwheat reared on the reservation at great expense. Instead these foods fell to the ravages of crows and rats, enemies of the heath hen, which were thus nicely pulled through the winter to continue their depredations on the eggs and young of the birds we are endeavoring to save. At no time during the fall and winter did the birds appear on the reservation (except one bird reported by Mrs. Allan Keniston) because of the abundant food supply present throughout the range of the heath hen. Not all winters will be like the one of 1923-24, but adverse conditions can be met by a ready supply of food kept at the reservation and distributed properly by the superintendent when needed. The superintendent should be relieved of intensive farming operations and give more direct attention to the birds, which he has not been able to do in the past. It is very important that all of the isolated flocks on the island in places remote from the reservation be given an equal amount of attention as the one on the reservation. In 1923 there were more birds on the farm of James Green near West Tisbury than there were on the reservation, and surely some money and some of the superintendent's time should be devoted to these flocks whenever help is needed. Aside from the raising of crops, killing of vermin and maintaining roads and buildings, little was being done for the direct benefit of the heath hen, the main object of the reservation. As soon as these conditions were made known to the director of the Division he was quick to bring about the needed changes.

"A study of the food of the heath hen based on records of crop and stomach contents of 34 birds, collected during the past 50 years, but most of them about 30 years ago when conditions as far as available food is concerned were not very different from conditions present on the Island today, revealed that bearberries were eaten by 12 of the birds; leaves (all native plants) by 10; acorns by 9; grasshoppers by 7 (one each in November and December, and 5 in October); buds by 5; partridge berries by 4; bayberries by 3; seeds by 3; roseberries and pine buds one each. All of the above foods are of native plants which are present in abundance within the present range of the heath hen. The birds noted in the above tabulation were collected during the months of October, November, December, January, February and March. These records serve to give us an index of the food eaten during those months. In the spring (April-May) the birds eat much green material, but this green material does not necessarily mean cultivated plants but chiefly the new tender leaves of plants we generally consider as weeds. This was substantiated by the examination of the contents of the crops and stomachs of the males taken during April and May. For example, a bird trapped on April 5 had its crop gorged with 1,846 leaves of the sheep sorrel, weighing 32.2 grams. The interesting part of this record is that the bird having the choice of various blades of cultivated grasses and other plants chose nothing but the leaves of a weed detested by the farmer and gardener. Sheep sorrel grows in extensive patches on the meadows of the reservation and birds observed during April were usually restricted to those areas while feeding. This weed thrives on poor as well as rich soil, especially if the soil is acid, and intensive cultivation is not needed to produce it. In May, from my blind, I saw birds nip the leaves of clover, but they did not feed on clover to the extent that they feed on the leaves of a plant technically known as *chrysantheneum leucanthenum pinnatifidum*. I also saw them feeding extensively on the leaves of mitchella, blueweed, rabbitfoot clover, and other such plants abundant on the reservation especially among the grasses and clover of the meadows. In fact, the meadows serve as a 'dinner table' as well as a 'drumming field' for the birds during the spring of the year. Further an ecological study reveals that few crops induce a greater variety and abundance of insects than do the fields of clover timothy and similar grasses. In these fields the birds feed upon the green material in spring, and upon insects, especially grasshoppers, in the fall (October-December as shown by the above list of foods eaten by the birds). For those reasons it was strongly recommended that the meadows be continued. During the summer the birds probably select berries, fruits, seeds and insects, but I have little data to verify this supposition. Whatever their food may be at this time the birds invariably desert the open fields and pasture lands and nothing need be provided for the birds at the reservation at this time of the year.

"Needless to say the fire stops should be continued as they have been in the past and every effort made to forestall a destructive fire such as occurred in 1916. The same vigilance in keeping down the number of vermin, especially cats, should be continued as in the past, but we also need to educate the public not to dump cats loose on the island. The winter population of Martha's Vineyard is about 5,000 and the summer population is said to exceed 50,000 people. Many of the summer people bring cats to the island which they thoughtlessly allow to run wild and shift for themselves when the summer homes are closed for the season. This abominable practice tends to ever increase one of the worst enemies of the heath hen. Much local publicity should be given this matter and every means taken to prevent it.

"We do not advise the introduction of the western prairie hen, which has been suggested by several persons interested in the reservation, either from a sentimental or practical standpoint. If it is a choice between the 'Going of the heath hen' and the continuance of a mixed race, most of us prefer the former. Furthermore in the past repeated attempts have been made to introduce the prairie hen into sections of Pennsylvania, New Jersey and New England, but all of these experiments have failed. In Pennsylvania the birds thrived for a while but in a few years disappeared entirely. An attempt to transplant some of the heath hen



of Martha's Vineyard to Long Island also failed. It is doubtful if a transplantation of birds from the west to Martha's Vineyard would prove any more successful than previous attempts made elsewhere. The sportsmen of today as far as I can ascertain prefer other birds even if the heath hen could be brought back to the status of an abundant game bird. Hence there seems no good reason why the western bird should be introduced for practical reasons.

"An important factor in the preservation of the heath hen which should not be neglected is local sentiment on Martha's Vineyard. I have noted a strong feeling among the natives against the heath hen. In fact, some very influential men of the island have expressed in no uncertain terms their keen desire to see the heath hen replaced by other game birds. It is important that those in a position to do so, should do all that is possible to stimulate local interest and pride in these birds. The superintendent, though capable and active, cannot patrol such a large area successfully without the backing of favorable local sentiment. If the leading citizens of the island take an active interest in the preservation of the heath hen it will help much in prolonging the life of these interesting birds.

"It is a pleasure to acknowledge the complete co-operation which the State department has given us in the study of the heath hen. I wish also to take this opportunity to thank Mr. Allan Keniston for his generous hospitality and help at all times during my frequent visits to the reservation.

ALFRED O. GROSS."

#### *Myles Standish State Forest*

While this reservation serves as a game sanctuary, it is conducted primarily as a State Forest and public camping ground. Hence the greater part of the superintendent's energies are directed along those lines, with the care of wild life incidental.

There were 108 pheasants reared and liberated, some on the reservation and the remainder locally, together with 37 adults. Quail have been quite numerous on the reservation, but grouse fail to increase. Fox and skunks are too numerous, and vermin generally is increasing. To keep it down would require a far greater expenditure of time than has been possible. There were destroyed 5 foxes, 15 skunks, 7 great horned owls, 3 red-shouldered hawks, 6 red-tailed hawks, and 6 weasels.

#### *Moose Hill Bird Sanctuary*

The work at this station, which was started in December, 1918, by the Audubon Society and this Division working in co-operation, has been rather fully described in previous reports. It proceeded along similar lines last year, with a continuance of the steady growth and expansion which has characterized it from the beginning. Up to this time the Division had contributed each year toward the superintendent's salary. At the close of this fiscal year it was necessary to discontinue these payments, by reason of lack of funds.

#### *Penikese Island Sanctuary*

By an act of the General Court of 1924 (Chapter 477), Penikese Island came under the jurisdiction of the Department of Conservation, Division of Fisheries and Game, as a refuge and sanctuary for wild birds on September 1, 1924.

Penikese Island has an area of about 100 acres of the undulating country characteristic of Cape Cod, sloping down to rocky shores which gives good natural drainage. There is a luxuriant growth of grass all over the island, a very few scrub bushes, and no trees except a few about the buildings. There is a good area of cultivatable land where all the bird-food needed could be raised. There are two small, fresh-water ponds, with possibilities of a third.

When taken over, the equipment consisted of a dock, in good repair; the administration building, which had housed physicians and attendants; a group of small barns, sheds, etc.; the group of buildings which had housed the patients, including the concrete laundry building, general hospital and recreation building, and four single cottages. Though at the time in fair repair, they were rapidly



going to pieces. There was a considerable amount of machinery including refrigerating and laundry equipment, engines, motors, generators, etc. The use of the island as a bird sanctuary requires the removal of the buildings and machinery.

The Director made two personal inspections of the island in company with representatives of the Division of Ornithology, the Department of Health, the local Board of Health and the Commission on Administration and Finance. On September 22 the latter commission and this Division filed a joint report with the Governor, recommending the removal of all buildings and machinery, first offering them for sale to the highest bidder, proceeds to revert to the Treasury of the Commonwealth, the one-story 24 x 26 laboratory to be saved for such service as future plans might demand. The report was approved, and bids duly called for, but none received. It is planned to remove the buildings by fire and dynamite.

The island is a natural breeding ground for sea-birds, and for many years has harbored a large colony of common terns. These will be fostered in every possible way.

The island offers various possibilities. Future plans contemplate stocking it with quail and cotton-tail rabbits, the surplus to be used in stocking the adjacent islands and the near-by mainland. It should be possible to breed ducks in the ponds, and perhaps by the use of live decoys and a constant supply of food and fresh water, to make the island an attractive stopping place of wild geese on their spring and fall migrations.

#### *Reservations under Sections 69-75, Chapter 131, General Laws*

The term of the Randolph Reservation expired June 21, and on petition it was renewed for five years from November 10.

Petition was received for the renewal of the Hubbardston Reservation, which had expired in 1923. Favorable action was taken, and the legal technicalities are in process of completion.

## INLAND FISHERIES

### GENERAL

While the artificial propagation of certain species has been pressed, and many restrictions placed on taking, our supply of freshwater fish is not holding its own. The various species are given some protection during the breeding seasons, for periods between March 1 and June 15, and there are also certain restrictions on methods of taking and catch limits. But as a practical matter, most species can be fished for from nine to ten months in every year. This is too long an open season, and the stocks will not stand the strain. No new waterways are being provided, and those in existence are being gradually encroached on through all forms of development and human activities. None of our waters are growing purer or more favorable to fish life; the tendency is all the other way. In addition to the foregoing, the number of fishermen is increasing every year.

Both by attempted legislation, by comments in our reports, and by communications to the public, our conviction has been stated that some restriction must be made on winter fishing. The last legislature authorized this Division, upon application from the town governments, to set aside areas in great ponds as breeding grounds. So far practically nothing has been done under this act, though its objectives have been brought to the attention of the boards of selectmen. It is always with reluctance that we propose further restrictions on the taking of game and fish, for it is realized that this alone will never bring back the supply. At the same time, it is obvious that the wholesale capture of fish immediately prior to the breeding season, or the taking of fish from a given body of water over a sufficient number of months in a year to constitute an unreasonable demand on the stock in the pond, are factors which must be corrected if we hope for increase through natural means. There is need for closer biological examination of our waters and of the breeding and feeding habits of our native stock. It is highly essential that protected areas be established, and that all necessary safeguards be set up.

## TROUT

The trout fishing season was very poor, the most unsatisfactory for several years, with catches far below normal and not many large fish taken. A cold, late spring, followed by absence of rain and consequent low water, are probably the prime causes. Because of the long-continued drought of the summer and early fall of 1923, only a portion of the stock in the streams (both fingerlings and adults) had survived that period, creating a shortage this season. With streams reduced to a mere trickle of water — often disappearing altogether for some distance — the water temperature was too high for trout to live in. In addition, the low water gave unusual opportunities for mink and other predatory animals to take their toll. In some of the rivers, such as the Swift River and the West Branch of the Swift River, and in some of the larger streams, good catches were made, but these were the exception and not the rule. During the summer of 1924 the abnormally dry conditions were repeated, and the brooks went so low that the distribution of the output of the fish hatcheries was suspended until conditions were improved by the rainfalls of late summer. But the succeeding long period of drouth, lasting through October and into November, brought them low again. No doubt these two years of unfavorable climatic condition will be reflected again in the fishing season of next year. In Berkshire County, the natural trout fishing section of Massachusetts, the catches went somewhat better, but here also the season fell below its usual standard of excellence.

## CHINOOK SALMON

The problem whether to continue the propagation of Chinook salmon arose again this year. A certain part of the fishing public favors a continuation of the planting of salmon to those ponds in which the species has survived, not necessarily in the expectation of large fish, but for producing a supply of the 12 to 16-inch fish which they claim furnish good sport fishing with a single shrimp on a small hook. There is an equally strong sentiment in opposition, for experience has shown that the salmon are produced at the expense of the other fish. During the time the salmon were in Long Pond they practically exterminated the smelt, and the bass which fed on the smelt were likewise greatly reduced. After the disappearance of the salmon the bass fishing began to slowly improve, and objections are advanced to further introduction of salmon as being certain to delay the rehabilitation of other fishing. The Division decided to discontinue salmon in Long Pond, but to continue to stock certain other ponds in which previous experiments were successful to a certain degree. (See Fish and Game Distribution.)

Apparently no salmon were taken in the State during the year; rumors of a few catches reached us, but nothing authentic.

## PIKE PERCH

It is a disappointment to record that, from present indications, pike perch are not establishing themselves in Massachusetts waters. While our distributions have not been on a large scale, they have been sufficiently large and over a sufficiently long period of years to have shown results by this time. Massapoag Lake, Sharon, is the only body of water from which they are taken in numbers, —elsewhere in the State only occasionally.

At the last session of the legislature protection was given to this species during the breeding season. This particularly affects a region in the Connecticut River adjacent to the town of Turners Falls where there is a natural spawning area. It is believed that in time the fishery may be built up to such an extent as to be a factor in the fishing of the Connecticut River.

## PICKEREL AND WINTER FISHING

Taken as a whole, the pickerel fishing of the winter of 1923-24 was fair and some good catches were made. Ice conditions were fairly good, though the season was short as the ice did not form until well into the winter. In general the fish and



the catches are running smaller, considering the State as a whole; and in many places only the first day yielded good fishing. On Cape Cod fishing was good, but the season was short owing to lack of ice in some of the spring-fed ponds. Some favored localities in Berkshire County particularly, continue to yield large pickerel, but these are exceptional.

This year a special effort was made to collect definite facts on the detrimental effects of winter fishing. Between January 13 and 24, 1924, ten wardens inspected 1,108 fish taken through the ice, and found 75% to be females, heavy with spawn. On Sunday, January 13, the warden counted 109 fishermen on Cheshire Reservoir in Berkshire County. It is a fair assumption that each was using ten traps, which meant that over a thousand pieces of gear were being used at the same time (and on a limited part of this reservoir, for all of it is not suitable for fishing). The foregoing will serve to visualize what is going on, and no great imagination is required to see to what it will lead. More and more the fishermen are recognizing the folly of present practices, and there is undoubtedly a growing sentiment for the restriction of winter fishing to prevent this waste of breeding fish.

### BASS

Taking the State as a whole the fishermen enjoyed good bass fishing this year. The breeding season was not especially favorable, due to cold water, and it is probable that less young than usual were produced.

### WHITE PERCH

There is nothing special to report as to white perch, other than that they are doing well in the ponds in which they have been planted over a number of years. (For report of salvage activities, see "Fish Distribution.")

### SMELT

In the rivers and coastal streams which are free from pollution and open to the passage of the fish there was a good run of smelt. In the Rowley and Parker Rivers there was a continuous and heavy run from March 22 to April 9, with a heavy set of spawn, much of which was destroyed incident to the taking of alewives in these same streams later.

In Fresh River, Hingham, and Weir River, Hingham, there was the biggest run in five years, and a great number of smelt went into Straight Pond. At East Weymouth for three or four nights there were quite a few smelt. At Weymouth there is an open sewer which makes conditions unsuitable for the smelt to come in. There was a good set of spawn around the Weir River, but not the excess deposit of other years. The run on Martha's Vineyard was unusually large.

The usual patrol work was done on the smelt streams.

### HORNED POUT AND CATFISH

There is nothing particularly noteworthy to record with reference to the horned pout, and no special change in conditions since last year. In several districts it is said that the hatch was poor, and not so many schools of young seen as usual. Reports of excellent catches, and reports of poor yields, are about equally divided.

A check-up of the waters stocked recently with adult catfish from Ohio and Pennsylvania gave almost negative results. One is occasionally taken, but no signs as yet that they are establishing themselves.

### PONDS

#### *Ponds Stocked and Closed*

The following ponds were stocked under Section 28, Chapter 130, General Laws, and closed to winter fishing by regulations which in all cases expire November 1, 1927; Holland Pond, Brimfield; Congamond Lakes, Southwick; Massapoag Lake, Sharon. The usual regulations apply.



*Privately-owned Ponds Stocked*

The following privately-owned ponds were stocked with food fish on stipulation of the riparian proprietors that they will permit public fishing therein for a specified term of years:

Pond of J. Warren Moulton, North Rutland, fishing permitted to May 19, 1934.

Canoe Pond, Brewster, fishing permitted to August 23, 1934.

Long Pond, Rutland, fishing permitted to September 26, 1934.

The following privately-owned pond was stocked on agreement by the owner to permit the Division in future to take an equal amount of stock from the resulting increase:

Admiral Francis T. Bowles, pond in Barnstable, brook trout.

*FISHWAYS*

The fishway program pursued in 1924 was much the same as in other years. Results in the existing fishways were checked up, preliminary surveys made, and work leading to the installation of new fishways was carried on, the details of which will be presented when the opening up of the streams has actually been started.

*Ipswich River*

*Ipswich Mills Fishway.* — The fishway in the dam of the Ipswich Mills was inspected several times during the period that alewives usually run, and found each time to be in perfect working condition. The reconstruction of the lower end of the fishway by the addition of new compartments last fall enables fish to find their way into this fishway even at low tide. No fish were observed during any of the inspections. The progeny of the transplanted adult spawning alewives planted up stream are not expected to return to the river until next spring. There is a considerable amount of pollution in the form of dyestuffs from the mills.

*Norwood Mills Fishway.* — Early in December of 1923 relations were again opened up with the owner of the dam on the Ipswich River known as Norwood Mills. Though plans and specifications had been submitted early in 1922 for the installation of a concrete fishway at this dam, the matter was not pressed until the addition to the Ipswich Mills fishway had been completed. After the accomplishment of this in 1923 it was felt that the time had come to open up the next obstruction above, namely, at Norwood Mills. As a result of a conference between our biologist, our engineer, the owner and his contractor plans and specifications for a wooden fishway were designed to be constructed in the flume under the mill rather than a concrete fishway at one side of the dam out in the river. Assent to the building of this wooden fishway was given by this Division with the understanding that the State would not accept it under the provisions of Section 19, Chapter 130 of the General Laws, which provides that if a fishway has been constructed in accordance with that section, no changes shall be required in five years. In this instance the Commonwealth reserves the right to require changes if the fishway which the owners wish to build does not, in their opinion, function properly. The fishway was finally completed on August 29, 1924.

*Willowdale Dam Fishway.* — With the opening up of the first two obstructions on the Ipswich River (Ipswich Mills Dam and Norwood Mills Dam), the time has come when a fishway should be installed on the third dam on this river, known as the Willowdale Dam. Plans and specifications had been presented in 1922, but on account of the obstructions below, the matter was not pressed. Negotiations will be opened up early in the year.

*Saugus River*

Further study and surveys have been made on the Saugus River.

*Universal Tide Power Company.* — The first dam on the river is that of the Universal Tide Power Company. This location was visited in August, and there appeared to be a passageway for fish. The manager and men in the plant reported that they had seen numbers of alewives running up the stream in the spring. A

few alewives were caught in the stream below the next dam above (Wallace Nutting Dam), proving that some of them had passed the dam of the Universal Tide Power Company, — otherwise they could not have reached the location where taken.

*Wallace Nutting Dam.* — The plans and specifications prepared in 1922 for a fishway on this dam have been discarded and after further study and survey a second set completed, which call for a fishway which will start from a point at the bottom of the plank sluiceway and make use of the present fishway ruins as a foundation. The situation is an extremely hard one to take care of, but it is felt that the most economical and workable solution has been found. The new plans will soon be presented to the owner of the dam, and it is expected that the installation of the fishway will be under way when water conditions in the river are favorable.

*Prankers Pond Fishway.* — Examination during October of the wooden fishway on this dam showed it so far beyond repair, that measurements were taken for plans for a new concrete fishway. These are now ready for presentation, and with the co-operation of the owners (the U. S. Worsted Company) it will be possible for fish to surmount the entire Saugus River unobstructed.

#### *Parker River*

No further action was taken during the year towards removing the obstructions on this river. Conferences with those in interest were held and negotiations will be opened with the owners next year.

#### *Merrimack River*

*Lawrence Fishway.* — Owing to extremely high water continuing late into the spring, the repairing of the dam and connecting of the flume were delayed until May 20. The fishway was officially open from May 20 to June 30 with an observer on duty, and inspections made at regular intervals. The first alewives were seen on May 20, and none after June 26. The extreme drouth rendered the fishway useless through the summer and fall, but it functioned properly at all times during the alewife run, with the right amount of water passing through.

The number of fish observed to use the fishway was decidedly smaller than the previous year, and up to June 5 practically no alewives were seen. It is not to be concluded from this, however, that they did not ascend. On the contrary, the presence of large numbers at the Lowell fishway above, proves that they did pass the Lawrence Dam, since there is no other way by which they could have arrived at Lowell. The probability is that the run occurred at night. Between May 20 and June 30 there were recorded in the fishway 190 alewives, 3 carp, 2,719 shiners and dace, 1 trout, and 137 miscellaneous fish.

The iron flume and overhead iron work were painted, and minor changes were made in the lowest compartment of the fishway during the fall intended to break the force of the water which during periods of high water had prevented the fish from entering.

*Lowell Fishway.* — The fishway at the Pawtucketville Dam was open from May 23 to June 27 with an observer on duty. Frequent inspections showed the fishway to be operating satisfactorily. Alewives were first seen on May 24 (about ten days later than the previous year) and they ran up to June 27. At Lawrence they were first seen on May 20, making an interval of four days before they reached the Lowell fishway. This interval checks against that time consumed last year in running between the two dams. The observer's records show that from May 23 to June 27, there were 4,561 alewives, 3 carp, 28 shiners and dace, and numerous miscellaneous fish that used this fishway — a decided increase over 1923. On inspection June 5 and 10 every compartment was literally crowded with alewives, yellow perch, shiners, dace, and suckers, and the fish could be seen surmounting each compartment in great numbers and jumping a considerable distance.



*Paskamansett River*

Inspections of the fishway installed at Russell's Mills, South Dartmouth, two years ago, on the Cummings Dam, were made during the spring. The river was extremely high all through the spring, and the water came over the dam in great volume, completely submerging the fishway. Observations over two years show that changes must be made if this fishway is to function properly.

*Barker's River*

Inspections during the alewife run were made, and while the fishway functioned sufficiently well to allow thousands of adult fish to reach the spawning beds, it is believed that with some minor alterations at the upper end to which the owner has agreed, it will be greatly improved.

*Taunton River System*

The fishways on the Taunton River system were checked up frequently during the spring run. With possibly one or two exceptions, all functioned satisfactorily, and in many of them large numbers of fish were observed. The alewives which appeared in the Town River (of the Taunton system) this year and last, were the first seen for a great many years in that locality.

*East Taunton Fishway.* — At the East Taunton fishway, on the Taunton River, there was a very good run of alewives; in fact, much larger than for several years. This was most gratifying, inasmuch as this was the year when results might be expected from the adult alewives planted in the headwaters of this system. The fish ascended the streams in such numbers as to draw very unusual numbers of sightseers.

*Jenkins Leatherboard Company Fishway.* — Observations were made periodically at this fishway (located on the Town River) starting in March and continuing well into June. The fishway worked properly all through the season, with the proper amount of water passing through it. On March 31 a few yellow perch were observed just above the fishway, — but possibly so-called "native fish" which did not use the fishway. Soon after May 1 alewives were seen in this fishway at Prattown, Bridgewater, and again on the 18th.

*Stanley Works Fishway.* — A representative of the Division made several inspections of this fishway (located on the Town River) during the spring, beginning early in April, and at all times it was found operating properly. On May 16 the first alewives were seen in this fishway. To reach this point it was necessary for these fish to first pass through the fishway of the Jenkins Leatherboard Company. On May 19 several were again seen in the fishway, trying to shoot the falls at the dam.

*Easton Investment Company.* — The fishway located on the old Ames Dam (on the Town River) at West Bridgewater, was inspected frequently during the spring.

On April 4, large numbers of yellow perch were observed in the various compartments. On April 11, large schools of adult yellow perch, perhaps 200 to 300, ranging in size from 11 to 15 inches, ripe and ready to spawn, were seen, many of which had pocketed under the spillway of the dam, having gotten by the entrance to the fishway. Representatives from this Division dipped and lifted these fish over the dam. In order to overcome this pocketing under the spillway of the dam, changes have been made in the topography of the dam surrounding the fishway. There is no authentic record as yet of alewives having appeared at this fishway.

*Hanson Cedar Company.* — The fishway installed in 1923 was examined during the spring and found to be functioning properly. After two years' observation it is felt that the base of the run in the top compartment should be dropped down lower into the bed of the stream to permit the water to pass through the fishway during the low-water period. No alewives have yet been seen in this fishway.

*Carver Cotton Gin Company Fishway.* — The fishway of the Carver Cotton Gin Company at East Bridgewater (on the Satucket River) was inspected periodi-



cally from the end of March until well into June. On several occasions in the spring it was found with no water passing through it, but the matter was remedied on being called to the watchman's attention. On April 4, yellow perch were observed at the entrance to the fishway.

No alewives have yet appeared on this branch of the Taunton River system. This may be due to the fact that at a point along Stump River, Halifax (which leads from Monponsett Pond, where adult alewives have been planted for the past few years, and which runs eventually down through the Carver Cotton Gin fishway and Jenkins Leatherboard Company fishway), an obstruction was discovered during the summer which prevented the young alewives from passing down the main channel of the river, and caused them to enter the canal which floods the bogs of a cranberry grower. Thousands of fine alewives, large and small, were found dead in the sluiceway or flume of the canal near the Halifax Cranberry Bogs. This has presumably happened for the past two years or more, and would explain why no alewives have yet appeared in the Satucket River.

*Electric Light Power Plant Fishway, and Star Mills Fishway.*—These two fishways (located in Middleboro on the Nemasket River) were inspected at various times during the spring run, and found to be in first-class condition, and the water passing through them was well regulated. The town of Middleboro hired a man during the season to clean up the stream, and also to clean out periodically the screen leading to the power station. Alewives were noted in good numbers on May 15 at the Electric Light Plant, surmounting the fishway and reaching the pond above Wareham Street without difficulty.

The fishway at the Star Mills below Wareham Street operated effectively, and upon examination it was noted that each compartment was well filled with alewives, which ascended without difficulty.

#### *Agawam River — East Wareham*

This stream and fishway were examined periodically during the spring by representatives of this Division. The water passing through the fishway was well regulated.

#### *Monument River Fishway, Bourneedale*

This fishway (located on the Cape Cod Canal), was inspected several times during the spring and summer during periods of both high and low water. The lower end is in a very dilapidated condition with much of the construction broken away, and at low tide fish cannot surmount the structure because the lowest compartments do not reach far enough into the canal. At high tide the fish can surmount without difficulty. A great many were observed in the compartments and at the entrance to the fishway in the canal, and for a considerable distance the canal was black with alewives, all heading for the fishway, but unable to surmount during the low water period.

#### *Red Brook, Cataumet*

The fishway on Red Brook was examined during the spring and found to be in a very dilapidated condition, with the concrete at the lower end almost entirely broken away. The outlet to the pond under the highway was screened so that no fish could reach the pond. There was a good flow of water through the fishway, each compartment was filled with alewives, and the stream below the fishway contained a tremendous school, all heading toward the fishway, for none of which could it be possible to reach the spawning beds. Investigation is in progress, and as the pond where the fish spawn is privately owned, adjustments will be necessary.

#### *Beaver Brook, South Ashburnham*

A survey was made in April of a dam on Beaver Brook, South Ashburnham, which resulted in the presentation of plans and specifications to the owner on April 29.

## POLLUTION

A step toward the correction of the menace to the coastal fisheries and shellfish fisheries by oil pollution was accomplished by the enactment of the Federal "Oil Pollution Act of 1924." This prohibits the discharge of oil into or upon coastal navigable waters of the United States, except in cases of necessity, imperilling life or property, etc. The Secretary of War is authorized to prescribe regulations permitting such discharge under certain circumstances, and certain investigations by the Secretary of War are also provided for.

## PROPAGATION OF FISH AND GAME

## FISH HATCHERIES AND GAME FARMS

*General*

In the operation of fish hatcheries and game farms there are two objectives — first to discover the maximum possibilities of a station; and, second, to try to obtain such production annually. In arriving at a maximum production not only quantity is a consideration, but also the cost per bird or fish. We are keenly alive to these tests. Checking the results at the bird farms is an easier operation than apportioning the cost of operating a fish hatchery among several species of fish all requiring different handling; but our records are so closely kept that in most instances this can be done with reasonable accuracy.

*Amherst Rearing Station*

Construction and improvement work was, for the most part, limited to the completion or improvement of permanent structures already in process of building, — which included finishing and painting the outside of the new camp and repairing the cement foundation; several new ponds were built, old ones improved, six troughs built for sorting and holding fish for shipment; grading and filling done about buildings and ponds; electric light installed in the camp, meat house and shipping stand. A section of springs on the Graves property was rented, and fifteen ponds built for experimental work with the fish from the East Sandwich Hatchery.

The station was opened on February 25 to prepare to receive stock. This consisted of 203,000 fry from Montague, 252,600 fry from Palmer, and 220,000 fry from East Sandwich. There were 1,740 yearling fish received from Montague. Distributions to public waters totalled 293,490 fingerlings and 1,400 yearlings.

*Montague Rearing Station*

Though no large jobs were undertaken, much work was done to improve the appearance of the station and to facilitate the work, such as making a cement base under the porch on the new building and cement foundation and drain for the sorting and retaining tanks; construction of platform to serve as loading stand; covering the hatch house with roofing paper; rebuilding of dams; building a series of large ponds on the stream up to the ice pond, with dams of large dimensions to take care of flood waters; widening brook and lining same with plank; brush was cut, ground cleared, and flowers started.

The station began to receive eggs on December 11, 1923, and shipments continued until a total of 800,000 had been received from commercial dealers, and 200,000 from Sandwich, which with the 100,000 from the hatchery stock made a total of 1,100,000 eggs handled. All did well except one lot, losses in the others being only normal. During the hatching period there was a large number of eggs lost, and later there were large losses from the "blue sac."

While in the fry stage there were 203,000 trout transferred to the Amherst Station; also 1,740 yearlings to Amherst, and 200 to Sutton. There were distributed to public waters 411,500 fingerlings (3-inch, 98,600; 3½-inch, 205,200; 4-inch, 104,200; 4½-inch, 3,500) and 10,000 fingerlings were retained for brood stock. The yearling distribution to public waters was 2,630.



Palmer Fish Hatchery

The work of the year for the most part was routine. The bass ponds were more completely cleaned of vegetation in the fall than usual, and the old raceways, in three of them, were replaced with cement construction. A new combination sluiceway and trap for the catching up of brown trout was installed at the head of the main holding pond. Sixteen bass beds of concrete and gravel were constructed as an experiment in replacing the old type of combination wood and gravel beds.

*Small-mouth Black Bass.* — The rearing of small-mouth bass was carried on about the same as in former years, but owing to the weather conditions the output was less than in 1923. There were distributed as advanced fry or No. 1 fingerlings 85,000, and as 2 and 3-inch fingerlings, 12,185. Twenty-four adults were sent to fairs for exhibition, and distributed later.

*Brook Trout.* — The egg-stock consisted of 18,500 eggs from wild trout in the brook on the hatchery grounds, 300,000 from the Sandwich Hatchery, and 400,000 purchased from commercial hatcheries. Shipments of fry, feeding from 2 to 3 weeks, were made, — 252,600 to the Amherst Rearing Station and 165,000 to the Sutton Hatchery. The remainder were held at the station, and at the small fingerling stage there were 12,800 sent to the Sutton Hatchery. There were 132,050 sent out on general applications and 8,650 held at the Station. The distribution of adult trout totalled 290.

*Brown Trout.* — There were 202,000 brown trout eggs purchased from a commercial dealer in New York, and healthy, strong fry resulted. During the period of growth, however, feeding difficulties were encountered, the fish refusing to take food, and consequently the greater part of them died. Only 15,150 were reared to fingerling size, of which 13,650 were distributed and 1,500 held at the station as addition to the brood stock, which now numbers some 5,632. There were eight adults distributed. (See also Fish and Game Distribution).

*Horned Pout.* — The season was less favorable than usual for the breeding of horned pout. There were reared and distributed 24,030, and 20 adults were sent to fairs and thence distributed.

*Pickereel.* — There were 460 adult pickerel (4 to 12 inches long) seined from the large supply pond and distributed on general application.

*Blue Gill.* — Forty-five adults were sent to the Eastern States Exposition and thence distributed.

Sandwich Fish Hatcheries

No extensive building program was carried on, work being confined to painting buildings at both stations; repairs to the Nye house at East Sandwich; wells driven at Sandwich to increase the water supply into the hatchery; 3 new rearing pools built at Sandwich, and wells driven to supply them; troughs, trays and screens repainted at both stations.

*Brook Trout.* — The work was carried on in the usual manner. In the fall of 1923 a supply of 2,166,000 eggs was taken from the brood stock at the two stations.

Distributions were as follows:

Planted in brooks (eyed eggs)	322,000
Palmer Hatchery (eyed eggs)	300,000
Montague Rearing Station (eyed eggs)	200,000
Sutton Hatchery (advanced fry, 1 inch, fed 6 weeks)	179,500
Amherst Rearing Station (advanced fry, fed 1 week)	220,000
Worcester Rearing Station (1¼ to 1½-inch fingerlings. This stock was distributed later in public waters as 46,000 fingerlings)	64,000
Canton Rearing Station 1½ to 2-inch fingerlings	25,000

(The club reported that all died except a few, which were turned into the rearing stream).



Public Waters: 2 to 2½-inch fingerlings . . . . .	14,000
2½ to 3-inch fingerlings . . . . .	18,000
3 to 3½-inch fingerlings . . . . .	25,000
3 to 4-inch fingerlings . . . . .	195,650
3 to 5-inch fingerlings . . . . .	100,925

Held for brood stock at hatchery and for rearing to larger fish for distribution . . . . . 32,644

There were 1,355 yearlings and 1,409 adults (14 to 16 inches long), planted in public waters.

*Chinook Salmon.* — Shipment of 100,000 eyed Chinook salmon eggs was received from California, from which were reared 75,100 three to five-inch fingerlings, which were planted in certain selected ponds as set forth under Fish Distribution.

### *Sutton Hatchery*

Changes and improvements in the ponds were made to increase the capacity, and to make handling more expeditious; more screens were discarded, and the arrangements for sorting and grading were improved.

After the trout distribution, the wooden pools or nursery pens were removed, and a good start made on building ponds in the space they had occupied.

Painting buildings in uniform color was continued, much of the older paper roofing was renewed, and the lattice work under the house piazza was replaced with panelled concrete.

There were 200 yearlings received from Montague.

The fish placed in the pools consisted of 344,500 fry (179,500 from Sandwich and 165,000 from Palmer), and 12,800 fingerlings from Palmer. The number reared was 240,000, of which 234,600 were distributed as fingerlings averaging 3½ inches. The average size was greater because of delay in planting, due to conditions of drouth, which made it possible to sort more extensively, and hold the smaller fish long enough to get better growth. One hundred and fifty adults (6-8 inches), were distributed.

The work of the year, apart from the routine work on trout, was largely in connection with pond work and pond fish.

Special work in a number of fields was done. Examination of pond and feeding station sites was continued; shipping troughs were constructed for the Amherst station, and transported there; breeding stock for pond work was secured and transported; many distribution trips were made on account of fish and game associations.

### *Marshfield Bird Farm*

The year's work consisted of the usual routine. The year opened with 664 pheasants on hand, to which were added 100 purchased, 30 received as an exchange, 4 black-neck pheasants received as a gift from Harvey I. Grace of Ohio, 6 more black-necks purchased, making 804. Of these 84 were lost, 188 distributed, leaving 532 on hand at the beginning of the breeding season. From these there were 18,711 eggs collected; 9,885 young hatched; 3,344 liberated; 100 young contributed to the egg-stock at Ayer. At the close of the year there were 361 young on hand for distribution and brood stock. The above hatching operations included the handling of 600 eggs of the black-neck pheasant, purchased in Ohio, together with the eggs from the 10 black-neck pheasants on hand. This resulted in 160 birds which are included in the young mentioned above as being reserved for brood stock.

There were further distributions of adults in the fall to the number of 71, and 18 were lost, leaving 443 of the adult stock on hand at the close of the year.

### *Sandwich Bird Farm*

The construction work was continued on the equipment of brooder houses and yards for the pheasant work commenced two years ago, which is being pushed towards completion each year, along with use. A new section of winter yards

was added to the large yards. Part of the 10 brooder houses were floored over with cement; the incubator cellar floored with cement, and the walls finished. Two spaces between three of the brooder houses were filled in, making a continuous house 80 feet long and 10 feet wide, which now covers in the complete hot water brooder system which was installed two years ago.

Beginning with this year the rearing of quail and wood ducks was entirely discontinued, the stock distributed and the station turned into a plant exclusively for the rearing of pheasants.

The year opened with 652 pheasants on hand, which included young of the previous season held for breeders, others kept for liberation in the spring, and some older stock. There were 79 distributed and 30 lost, leaving on hand at the beginning of the breeding season 543 pheasants. There were set 16,011 eggs, of which 9,119 hatched, 4,298 young were raised, 3,880 were sent out on general distribution and 160 contributed to the stock at the Ayer Station, leaving 258 of this year's product on hand. The above operations included 300 eggs of the black-neck pheasant purchased in Ohio, from which 33 were raised to maturity. Among the adult stock there were further losses of 47, and distributions of 222, leaving 274 of the adult stock on hand.

#### *Wilbraham Game Farm*

There were erected 5 houses 20 x 10 feet, and 10 yards 48 x 20 feet for wintering adult pheasants. Fifteen 24 x 10 feet yards replaced temporary construction. House and out-buildings were wired, and electric light system installed. Additional grain bins and long benches were made for greater convenience in handling grain and eggs. Ten gates were put into ten of the old yards, and the brood pens enclosed with wire fence as protection from dogs. An incubator of 400-egg capacity was added.

The year opened with 1,185 adult pheasants, representing egg-stock, brood stock, and birds for spring distribution. Up to the laying period there were 50 lost, 331 distributed, and 300 set aside as egg-producing stock for public distribution. At the beginning of the breeding season the stock for the regular work of the station was 504 birds, of which 8 more were distributed a little later. There were 20,620 eggs produced, of which 20,420 were set and 9,195 young hatched, from which were reared and distributed 4,608 on general distribution, and 200 more were contributed to the station at Ayer to which the flock of egg-producers is to be transferred. For brood stock for the station there were 122 retained. Included in this number are 36 black-neck pheasants, the result of 360 eggs purchased in Ohio.

This station was the headquarters for the flock of pheasants which is set apart for the sole purpose of producing the eggs which are distributed to applicants for hatching, and the entire flock of 300 was contributed by this station as mentioned above. There were 8,907 eggs collected and 8,870 distributed, after which the remaining 290 adults were liberated.

#### *Ayer Station*

In the realization that the producing and distributing of pheasant eggs is a separate proposition from that of hatching and rearing young pheasants, and to relieve the superintendent of the additional work, arrangements were made to locate the egg-stock on property owned by Warden Backus at Ayer. A lease of the farm, with an option of purchase, was taken, and pens set up to accommodate the egg-stock. Such a geographic location as Ayer should work out to great advantage, being an important railroad junction and convenient for shipping to all points. There were contributed from the three game farms 460 of their early-hatched pheasants, of which 60 were liberated, leaving 400 on hand to start the work next spring.

#### *Myles Standish State Forest Reservation*

There were reared and distributed 108 young pheasants and 37 adults. (See also Reservations.)



## FIELD PROPAGATION

*Pond Cultural Work*

*Shaker Mill Pond.* — There was sufficient water in the pond during the winter to insure the welfare of the fish. Early in April one of the biggest spring freshets in twenty-five years was experienced and it was impossible to cope with the great amount of water that came down the Shaker Brook into the pond. Several of the screens were badly damaged, and at one time there was a foot of water running over the crest of the dam. It is to be presumed that a considerable quantity of the blue gill stock went down stream; but this is no actual loss, since the stream empties into Spectacle Pond at North Littleton, and thence into the whole Stony Brook system of ponds, all suitable blue gill waters.

Toward the end of April an attempt was made to draw the pond down and remove fish for distribution, but the excess amount of water entering the pond interfered, and after several days' work the attempt was abandoned for the time. There were distributed to nearby waters 1,650 fingerling blue gills (1,150 1 to 1½ inch and 500 2 to 3 inch), 165 horned pout (2 to 8 inches), and 15,001 shiners.

Plans were laid for drawing down the pond in October or early November, but the drought rendered such action unsafe, since there was no assurance of sufficient water to refill the pond. No brood stock additions were made. There appears to have been a satisfactory increase during the year.

*Stockwell Ponds.* — The work of collecting and distributing fish from the Stockwell Ponds in 1923 was not finished at the close of the fiscal year (November 30), and was completed in the present year and figured into this year's distributions.

The beginning of the work of 1924 disclosed an evident large increase in the fish population. The development of methods for the control and handling of life in the ponds worked out very satisfactorily, and in many respects is far in advance of the protection, or physical development of the ponds. The run-off of water and fish was wholly successful. In draining 50 acres there was no loss from stranded fish, and there was no part of the old drainage system that required re-opening, although it has been unattended for fifty years.

The population of the ponds, other than fish, all of which might come under the term of "crawling life" (and undesirable as competing in food consumption), was greatly reduced by dumping it below the sorting box after removing the fish.

The work in the early part of the year was largely cutting off the dead trees standing in the water. A beginning was made in planting the shores with trees furnished by the Forestry Division, and a much larger amount of shore and open land was cleared for the 1925 planting.

The stock was increased by 1,565 adult blue gills from General Butler Ames Pond, Tewksbury, but these, as was the case the previous year, showed only one in four to be spawning females.

Distributions from the ponds were: 28,700 fingerling blue gills; 4,200 fingerling horned pout; 12,000 fingerling yellow perch; 1,900 adult pickerel.

## FISH AND GAME DISTRIBUTION

## FISH DISTRIBUTION

The distribution of fish from the hatcheries proceeded along the lines followed the previous year.

A renewed and quite successful effort was made to have the sportsmen's associations furnish transportation and call at the stations for their allotments. Much duplicate stocking was avoided by close co-operation with the clubs. Owing to the summer and fall drought many good trout brooks became unfit to receive fish, and all brook trout distributions were stopped except to the large rivers and streams. The cost of distribution was \$4,452.05 against \$4,819.29 in 1923.

Distribution tables appear at the end of this section, to which reference is made to supplement the following reports of species. Facts and figures which may be readily ascertained from the distribution table have not been repeated elsewhere.



*Brook Trout.* — This year, there being a surplus of 322,000 eggs above the hatchery requirements, the planting of eyed-out trout eggs in feeder brooks (described in previous reports), was resumed. With few exceptions the percentage of hatch was high, and reports later in the season indicated good-sized fry and fingerlings in large numbers in almost every locality where plants had been made.

There were 1,471,215 fingerling brook trout distributed from the five stations as against 1,376,431 the previous year, and 7,234 adults and yearlings.

*Brown Trout.* — There were 202,000 brown trout eggs purchased commercially and handled at the Palmer Hatchery. (See Palmer Hatchery Report.) The year's production was divided among the following waters: Williams River, West Stockbridge; Heath Brook, Billerica; Venture Lake, Springfield; Middle Branch of Westfield River, Huntington and Chester; Charles River, Needham; Eagle Hill Stream, Wareham and Plymouth; Five Mile River, Spencer. Certain streams, after examination, have been added to the list of streams on which the Division has been concentrating its brown trout plantings.

*Rainbow Trout.* — For planting in the Deerfield River at Shelburne Falls and Charlemont, there were 2,020 fingerling rainbow trout  $1\frac{1}{2}$  to 2 inches in length purchased, this river being considered as very suitable water for this species.

*Blue Gills.* — Fish collected from Stockwell Ponds, Sutton, and Shaker Mill Pond, Ayer, comprised the stock for planting. (See Fish Salvage and Field Propagation for further details.)

*Alewife.* — The Division's efforts to re-establish depleted alewife fisheries were continued, which resulted in the planting of 1,750 spawning alewives in the Ipswich River above the dam at the Ipswich Hosiery Mill, 297 in Lake Nippinicket, and 416 in Monponsett Ponds.

*White Perch.* — The white perch work is included in the report on Salvage Unit following.

*Salvage Unit.* — With permission of the owners (whose co-operation is gratefully acknowledged), collection of pond fish was carried on at the following locations. Catches are given this year in considerable detail to reveal the real scope of this work:

Oyster Pond, Falmouth, April 30–May 27. White and yellow perch breeders were found in fair numbers and of good size,—white perch from 5 to 8 inches, and the yellow perch averaging 6 to 12 inches in length. Distributions from this body of water were 44,256 white perch and 14,725 yellow perch, a total of 58,981 fish shipped practically all over the State in 28 days' operations.

North Watuppa Lake, Fall River, June 20 to 28, yielded the following: adult small-mouth black bass, 8 to 26 inches, 2,840; adult white perch averaging 12 inches, 3,350; adult horned pout averaging 11 inches, 1,140; adult yellow perch 9 to 14 inches, 1,100; adult pickerel 14 to 29 inches, 88; total, 8,518.

General Butler Ames Pond, North Tewksbury yielded 1,565 blue gills which went into Stockwell Ponds for brood stock.

Ludlow Reservoir, July 8 to 16, yielded for distribution: small-mouth black bass 8 to 28 inches, 1,500; horned pout 6 to 13 inches, 500; yellow perch 8 to 11 inches, 400; sunfish (long-eared and common kiver), 300; pickerel 12 to 24 inches, 30; total, 2,730.

On June 21 the Merrimack Valley Power Company of Amesbury drew off the water in Meadow Brook, and the following were salvaged: yellow perch 2 to 8 inches, 4,000 (one-half fingerlings and one-half adults); horned pout 2 to 10 inches, 1,000 (one-half fingerlings and one-half adults); pickerel 6 to 18 inches, 300; sunfish 2 to 8 inches, 500; white perch ranging as high as  $2\frac{1}{2}$  pounds, 200; total, 6,000.

Various small salvage jobs by wardens and superintendents yielded the following stock, planted as a rule locally: Houghton Pond, Sutton, 30 adult white perch, 40 adult pickerel, 24 blue gills, 10 yellow perch, 20 rainbow trout fingerlings and 8 adults; Crane's Pond, Westfield, 126 adult bass; Meeting House Pond, Westminster, 44 adult bass; Hubbardston Reservation pond, 126 adult horned pout; private pond in Ayer, 7,500 horned pout fingerlings; Ludlow Reservoir, 16 adult horned pout; miscellaneous species, 70.

Shaker Mill Pond, Ayer, was drawn down for the first time since the cultural work was started in 1920. (See report on this station under Field Propagation).

*Chinook Salmon.* — As a result of requests for Chinook salmon there were reared at the Sandwich Hatcheries 75,100 3 to 5-inch fingerlings and planted in the following specially selected ponds, which past experience has shown to be at least partially adapted for this species. For reasons set forth in the section on Chinook Salmon under Inland Fisheries, Long Pond, Plymouth was not included: Peters Pond, Sandwich; Cliff Pond, Brewster; Sheeps Pond, Brewster; Ashumet Pond, Falmouth and Mashpee; Griggson's Pond, Barnstable; Bloody Pond, Plymouth.

*Small-mouth Black Bass.* — The fish from miscellaneous salvage operations in addition to the product of the Palmer Hatchery, comprised the stock for planting.

*Horned Pout.* — The usual yearly purchase of horned pout was not made, owing to change in ownership of the ponds. Distributions were made from the Palmer Hatchery, and a large number of all sizes were secured in the salvage work. Through the courtesy of the State of Vermont there were 2,500 fry and 800 yearlings obtained in the marshes of Lake Champlain.

*Fish Distribution to Public Waters, 1924*

	Product of State Hatcheries	Not Hatchery Product (Sein- ing, Gift, Pur- chase, etc.)
Brook Trout:		
Eggs . . . . .	— <sup>1</sup>	—
Fry . . . . .	— <sup>2</sup>	—
Fingerlings . . . . .	1,471,215	—
Adults and yearlings . . . . .	7,234	—
Brown Trout:		
Fingerlings . . . . .	13,650	—
Adults . . . . .	8 <sup>3</sup>	—
Small-mouth Black Bass:		
Fry . . . . .	85,000	—
Fingerlings . . . . .	12,185	—
Adults . . . . .	24 <sup>3</sup>	4,510
Horned Pout:		
Fry . . . . .	—	2,500
Fingerlings . . . . .	28,230	8,000
Adults . . . . .	185	3,082
Rainbow Trout:		
Fingerlings . . . . .	—	2,020
Adults . . . . .	—	8
Chinook Salmon:		
Fingerlings . . . . .	75,100	—
Yellow Perch:		
Fingerlings . . . . .	12,006 <sup>4</sup>	2,000
Adults . . . . .	—	18,235
White Perch:		
Adults . . . . .	—	47,836
Blue Gills:		
Fingerlings . . . . .	30,350	—
Adults . . . . .	45 <sup>3</sup>	24

<sup>1</sup> 322,000 eggs were planted in brooks to hatch.

<sup>2</sup> 550 fry were sent to educational institutions for experiments.

<sup>3</sup> Sent to exhibitions, and thence distributed.

<sup>4</sup> 6 of these sent to educational institutions.

	Product of State Hatcheries	Not Hatchery Product (Sein- ing, Gift, Pur- chase, etc.)
Pickereel:		
Adults . . . . .	2,360	458
Sunfish:		
Adults . . . . .	—	800
Shiners:		
Adults . . . . .	15,001	—
Alewives:		
Adults . . . . .	—	2,463
Miscellaneous species . . . . .	7	—
	1,752,600	91,936

GAME DISTRIBUTION

The distribution of pheasants from the three game farms was carried on much the same as in the past, auto trucks being used to a large extent, some rail shipments, and many deliveries to applicants who called at the hatcheries for their stock. A considerable amount of publicity was given the work by using conspicuously printed cloth signs on the auto trucks which carried the birds from the different farms.

*Pheasant Eggs.* — Pheasant eggs were again distributed from the Wilbraham Game Farm and the public was given the same quality of eggs as those used in the hatchery work. (See Wilbraham Game Farm). Plans have been made to transfer this work to a station in Ayer. (See Ayer Station.)

There were 1,260 black-neck pheasant eggs purchased from a western dealer and divided among the game farms, the resulting birds being added to the brood stock to change the blood lines. The black-neck pheasant is of the same family as the ring-neck, Mongolian and Prince of Wales, and is from northern China. In England it is considered by far the best sporting bird, being a higher flyer and faster on the wing. It grows to be about the same size as the ring-neck and is similar in appearance except for darker plumage with no white ring.

There were distributed from the game farms 12,000 young pheasants, 8,064 of which were distributed by auto truck and the remainder either called for or shipped by rail. No young pheasants were sent out after the middle of August, and arrangements were made with the sportsmen's associations to care for the late-hatched pheasants during the winter months and liberate them when conditions are right the following spring. This in the belief that by this plan many more will survive than if distributed as immature birds in the late summer and fall.

As time goes on it becomes more apparent that if the State is to have birds and fish on a scale necessary to annually restock its covers and waters, it will be necessary for the associations and individuals to take more active part in the work. Several clubs annually purchase substantial numbers of pheasants and white hares, two clubs are already operating small rearing stations for brook trout, and if the clubs will take hold of the wintering of late-hatched stock it will be a very substantial improvement over existing conditions. Forty-eight of the 131 clubs have volunteered, and 2,642 birds have been thus sent out.

*White Hares.* — There were 1,288 northern white hares, trapped in Maine, purchased and liberated between February 5 (as against January 23 the previous year), and March 5. We aim to get these animals into the covers as late as possible, and progress has been made during the past two years, considering that a good number of the 1921-22 distributions were made in December. This year 235 hares were gotten into the covers after the season closed, and this number at least, and a good proportion of the February distributions, have doubtless escaped the gunners.



*Hungarian Partridge.* — Both Nantucket and Martha's Vineyard offer very suitable conditions for grouse, with practically no native stock existing there, and none procurable. This seems an excellent opportunity to test the possibilities of the Hungarian partridge, and as a beginning, 20 pairs were liberated on Nantucket in December of 1923. On account of the crisis in the life of the heath hen the experiment will be confined, for the present, to Nantucket. Though the liberated birds were seen during the year, no young broods were reported. Five pairs were placed on Naushon Island by this Division, in addition to 18 pairs liberated by the owner of the island. These, too, have survived, though apparently there has been no increase.

*Miscellaneous Distributions.* — There were purchased commercially forty-eight Bob-white quail which were liberated, together with 8 from the Sandwich Bird Farm.

The remaining brood stock of wood ducks at the Sandwich Bird Farm, numbering 22 adults, were also liberated.

For liberation on Martha's Vineyard and Nantucket 240 cotton-tail rabbits were purchased.

*Game Distributions to the Covers, 1924*

	Product of State Hatcheries	Not Hatchery Product (Purchase Gift, etc.)
Pheasants:		
Eggs <sup>1</sup>	— <sup>1</sup>	—
Young	12,000	—
Adult	1,226	6 <sup>3</sup>
Quail:		
Adult	8	48
Hungarian Partridges:		
Adult	—	50
Miscellaneous:		
Adult	22 <sup>2</sup>	—
Cottontail Rabbits:		
Adult	—	240
White Hares:		
Adult	—	1,288
	<hr/> 13,256	<hr/> 1,632

<sup>1</sup> 8,870 pheasant eggs were distributed from the special stock kept for this purpose at the Wilbraham Game Farm, and 33 eggs were distributed from Marshfield.

<sup>2</sup> 22 wood ducks, remainder of stock at East Sandwich.

<sup>3</sup> 2 taken by warden, and 4 received from Metropolitan Park Zoo.

## MARINE FISHERIES

### INSPECTION OF FISH

The activities of this office for the past year have been in line with the plan pursued since the office was created in 1918, viz., the careful and frequent supervision and inspection of the retail fish markets of the State in every city and town where one is located; the inspection also of peddlers' teams which provide fish to the people in towns where no market is located; the almost daily supervision of fish landed from the vessels at the Boston Fish Pier, and the inspection of the stores of every concern thereon putting out fish to the public for consumption, also the daily inspection at the concerns along Atlantic Avenue and contiguous territory engaged in the same line of business. Besides this, this office has

covered in an effectual manner the cold storage plants and freezers taking in fresh fish and conveying them to the public for food in a frozen state. It has also made inspections of the producing fish ports at Cape Cod, Cape Ann, Buzzards Bay, Martha's Vineyard and Nantucket. Working within the scope of its jurisdiction it has also between May 1 and October 1 carefully inspected the many fresh fish trips landed at the port of Gloucester, which fish were intended for splitting and salting, to be turned into the well-known salt fish product of this State.

This office has endeavored by a most persistent system of inspection to safeguard the public to the end that nothing but good quality fish should reach the consumer.

No attempt has been made for a court record. All dealers have been visited impartially and advice has been frequently given which if followed would tend to give to the public better fish. At the same time this office has seen fit to bring to the notice of the courts several cases in which it felt that the law had been flouted and that court procedure was the only remedy left. Court procedure this year, as in past years, has been the last resort. Every effort has been made to safeguard the public by inspections under the so-called fish inspection laws, but when it has been found necessary, the law has been invoked to make examples of those who chose to continually defy it.

Speaking generally for the whole State, conditions as regards quality of fish sold in the markets to the public are somewhat improved. There is still room for more improvement, and in some quarters for much more improvement.

#### *Court Cases*

The number of cases taken to court this year is less than the previous year, but it is felt that the results, generally speaking, have been as satisfactory. It has been interesting to note the keen and broad-minded way in which "poor fish" cases brought to court have, generally speaking, been viewed by the presiding Justices and it has been heartening to note that with few exceptions the cases brought before them have resulted in convictions.

#### *Inspection at Producing Points*

Following his usual custom the Inspector has personally called at points along the state coastline, which are considered as being producing ports, such as New Bedford, Woods Hole, Provincetown, Chatham, Nantucket and Martha's Vineyard, including Edgartown and points at the western end of the island. At every port so visited the Inspector was well received and assured by both fishermen and shippers of their great interest in the work which the Division has undertaken in this regard.

The work of seeing to it that only good fish should reach the dining table of the public, several years ago found a ready response from the fish dealers of Gloucester. They were among the first to assure the Director of its value and worth to them and of their intention to live up to the regulations. As an instance of their sincerity they this year asked for all possible time of an Inspector or a deputy between the dates of May 1 and October 1, during which time approximately twenty-five million pounds of fresh fish (which were to be converted into salt fish) were landed on their wharves. The Director, sensing the importance of their claim, delegated the Inspector to spend at least three days a week during the time above stated looking over the catches and crafts landing fares at that port. It is felt that the results thus obtained were not only a benefit to the fish consuming public but to the dealers themselves. Figures given later on in this report will show what was done.

The result of the Inspector's observations during the six months at Gloucester were in the main satisfactory. The fares landed generally showed care in handling and sufficient icing; in short, there was an evident desire evinced by owners, captains and crews to bring goods to market in the best possible condition. Taken as a whole the fares of fish landed at Gloucester for splitting averaged high above the mark set as an acceptance point in years previous to the going into effect of the State fish inspection law.

*Jellied Swordfish*

The work of this office in regard to the condemnations of "jellied" swordfish has been continued along the lines of last year. There has been a general expression in favor of the attitude of the Division in this matter and also an evident attempt and desire to live up to the provisions that "jellied" swordfish may not reach the consumer of fish. This year less "jellied" swordfish were landed at the Boston Fish Pier. It is also gratifying to know that it was necessary to condemn less swordfish shipped from Nova Scotia points as being "jellied" than during the previous season. This was due without doubt to the fact that the Division's attitude on condemning "jellied" swordfish was made known to all Nova Scotia dealers and fishermen in no uncertain manner.

The Fisheries Department of Canada has also become very much interested in the stand of this Division as to jellied swordfish, both from economic and scientific standpoints, and after some correspondence with Dr. A. G. Huntsman, chairman of the Biological Board of Canada, this office recently shipped to the headquarters of the Board at St. Andrews, N. B., several samples from swordfish, showing the jellying in various stages, for use by the members of the Board in their scientific investigations into the subject. The samples were accompanied by copies of Dr. Belding's report on the subject, together with considerable other data which this office has collected. It is significant to find scientific bodies of such high standing as the Canadian Biological Board taking up so earnestly the investigation of a subject which was first opened up and put into effect for the cause of good fish by this Division.

*Work Accomplished*

Inspections in retail stores, 2,551.

Inspections in wholesale stores, 15,783.

Freezer inspections, 299.

Inspections of peddlers' carts, about 250 weekly at Boston Fish Pier.

Inspections at Yarmouth, N. S., steamer, 108.

Vessel inspections at Gloucester, 123.

General inspection trips, 9.

Groundfish condemned at Boston Fish Pier from vessels, 81,150 pounds.

Fish condemned at Gloucester, landed direct from vessels, 186,000 pounds.

Fish condemned in retail stores, 2,312 pounds.

Condemned at Boston Fish Pier from the Yarmouth, N. S., steamer, 135 pounds eels; 3,982 pounds mackerel; 1,253 pounds horse mackerel.

Condemned at Fish Pier of consignments on Yarmouth steamer; graded as "jellied" swordfish, 5,168 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 25,247 pounds smelts; 3,892 pounds salmon.

Condemned at Boston Fish Pier, arriving by rail, 5,800 pounds weakfish; 3,680 pounds carp; 110 pounds butters.

Condemned, landed at Boston Fish Pier; graded as "jellied," 104 swordfish — 26,643 pounds.

Total amount condemned at Boston Fish Pier and at Boston from Canada by rail and steamer, 157,060 pounds.

Total inspections, 19,133.

Total fish condemned, 345,372 pounds.

Total court cases, 10.

Total convictions, 7.

In addition to the work above enumerated, many fares of fish arriving at the Boston Fish Pier and at Gloucester were graded at the request of dealers or captains. The breadth of this inspection work can be gauged from the statement that practically every consignment of fresh or frozen salmon, halibut, smelts, mackerel, etc., from Canadian ports, arriving at Boston via rail and steamer were inspected by this office, both as to quality, and for grading if necessary. In one shipment of Pacific halibut, nearly 10,000 pounds were graded as number 3 fish



and sent to be salted and smoked, thus keeping them off the retail market for fresh food consumption.

From one of the largest fishing concerns in the state of Maine was recently received a request for complete information as to the fish inspection laws of this State, their inception, construction, method of enforcement and results. The letter stated that an attempt had been made for fish inspection in Maine, but had failed, but that another attempt would be made. Advice as to the best method to proceed was asked, and the writer, whose concern has had fares condemned at Gloucester by the Inspector, practically expressed his sympathy with the idea of fish inspection and would welcome the same in Maine. All possible information was sent the concern on the subject.

### *Blackstone Street Fish Market*

This is an outdoor market conducted by carts on Blackstone Street in the city of Boston each Saturday afternoon and evening throughout the year. Last year an average of seven carts was operated. The strictest inspection has been deemed necessary at this point and for that reason deputy inspectors have covered operations here at every business session. Speaking generally, the fish sold here during the past year have measured up to a fair and at times to a first-class standard, but there have been occasions where the quality has been so poor as to demand court proceedings.

Last year the Inspector in his annual report called attention to the fact that a considerable quantity of the fish offered here for sale came from the Boston Fish Pier and also that some of the men operating carts were employees of firms on the Boston Fish Pier, noting at that time that consequently the remedy was in the hands of the Fish Pier dealers themselves. It is felt that in order to properly handle the Blackstone Street situation it may be necessary, as is allowed by law, for the Director to formulate additional regulations which will have the force of law, and apply them to the producing as well as the selling point.

### *Inspection of Imported Fish*

Owing to the notice given to Nova Scotia shippers by this office and Boston consignees, an improvement has been noted in the condition of goods shipped from there, this being especially noticeable in regard to mackerel and swordfish. The work of the inspection of imported fish also embraces supervision of fresh and frozen stock from all Canadian points embracing smelts, halibut, etc. During the past year it has been found necessary to grade, and at times condemn portions of these shipments.

### *Conclusion*

It is evident that fish inspection work, speaking generally, throughout the State is conducive of good results to the fish eating public. It is also evident to the Inspector and his deputies that many wholesale and retail dealers continue their favorable attitude towards the work and show evidence of the same by the excellence of their shipments and the quality offered upon their counters at retail. This should not be taken, however, to apply to all. It is felt that there is some "lip service" and that some who profess willingness to accede to the fish inspection law and to assist the office in upholding it may go no further than talking about it. For instance, when a letter comes properly into the hands of the Inspector from a Nova Scotia shipper of fish, enclosing a sales statement for fish shipped by him to a Boston Fish Pier concern, on which is plainly written these words with reference to one fish in the shipment: "The fish at 17 cents was a jelly, but we got it by without the Inspector knowing it and got 17 cents for it," it can but create a bad impression. It is certain that when indisputable evidence of this sort, showing that a supposedly reputable concern seems not only proud of but boasts of breaking a law which has for its object the supplying only of fish to people that is fit to eat, this work of fish inspection is shown to be absolutely necessary and to be earnestly encouraged.

## THE DEEP SEA FISHERIES

"A generally successful year," can safely be written across the pages of the report of the Massachusetts fishing industry for the year ending November 30, 1924. In accord with the work of the fishing crafts fishing in Massachusetts waters and those landing at Bay State ports the fishing business was, as a whole, successfully conducted financially. True it is there are exceptions to both of the above statements in some instances, but also sure it is that the fish catch and fish landings exceeded those of 1923, and all these fish found a market; that prices averaged fair and that the industry is wearing an air of moderate prosperity. In short, the fisheries of the State have gone along in even tenor and results have been above the average when one considers in retrospect the whole fisheries story since the Armistice.

Some of the outstanding features of the year were, the splendid success of the mackerel fishery — the catch being nearly if not quite up to the year's record catch of 1923 and prices averaging higher; the continued successful prosecution of the fresh halibut and swordfish branches; fine catches of herring and mackerel by the Cape Cod traps; the building of quite a number of fishing crafts, fine and needed additions to the fishing fleet; the increased number of steam otter trawlers in operation; the continued and amazing success attendant on the flounder fishery; and a most marked and gratifying increase in the catches of cod and haddock of a greatly reinforced fleet operating on the in-shore banks, close at home, during October and November.

One cause for comment is the apparently depleted condition of the lobster fishery, this being another year of small catch following the sudden and unexplainable drop of last year, after a long series of successful and gradually increased catches which culminated in 1921 with the largest catch for 30 years.

The state's efforts, through the office of the Inspector of Fish, to have all fish landed and sold for food consumption measure up to a high quality standard has been somewhat generally co-operated in by the majority of captains, fishermen and dealers. Although there is still room for improvement in some instances, the great value of the enforcement of these fish inspection laws is generally recognized.

The various branches of the State's fisheries, together with resumés of fisheries operations at the various ports and fishing localities, are briefly treated under the following headings:—

*Winter Haddocking Fleet*

Although the landings by this fleet at the Boston Fish Pier from December 1, 1923, to May 1, 1924, exceeded by about 7 million pounds the catch of fleet for the same term in 1922-23, the season was not as remunerative to men and crafts as its predecessor, which was the best, from the money angle, in the history of this fishery. The 1922-23 period was marked by a succession of storms which made fishing generally difficult, producing decreased catches and consequently long-sustained spells of high prices in the efforts of dealers to supply a trade hungry for fresh fish. The 1923-24 season took on more of what in fisherman parlance is called an "open winter" — fewer and less severe storms, more days fit for fishing, consequent larger catches, larger supply to the dealers and lower average market prices: not that any winter weather on the fishing grounds is not bad enough, but just that some winters at sea — the same as on shore — are not as bad as others.

The season, however, could not be termed a poor one, but coming just after the record-breaker it did not show up to the best advantage. Many fine trips were landed and many crafts finished the season with comfortable stocks and shares to the credit of owners and crews. The first week of December, following a spell of moderate weather, found the fleet registering at the Boston Fish Pier for over five million pounds of fresh fish, practically all cod and haddock, the largest week's receipts there since the last week in February, 1923, which landings, in turn, were the highest since March, 1919.

Receipts continued generally from fair to good, with now and then a spell when landings were light, and consequently high prices accrued to the fishermen. Dur-



ing one of these spells, early in January, haddock reached the top-notch price of the winter, 16½ cents per pound from the vessel. During some of the weeks when fish were in large receipt many hundred thousands of pounds of fish went to smoke and to the splitters at Gloucester and Boston.

During the height of the season some 30 steam otter trawlers and fully 50 or more vessels of sea-going size operated. After March several crafts hauled out to engage in other lines, and by May 1 the fleet was on a shortened summer basis.

### *Summer Fresh Fishing Fleet*

The landings of this fleet at Boston and Gloucester for the season from May 1 to October 1, were practically the same as last year for the same period, a little less if anything, but satisfactory, although the splitters could have handled more fish. The season was practically featureless. Trips generally were made in good time and arrived well iced and in fine condition. There were, however, some exceptions to this, some crafts taking longer than usual to make their trips because of unfavorable weather and finding fish scarce. Except in few instances quality was well sustained, but several cases were found where fish did not come up to standard and these goods were promptly condemned by the State Inspector of fish.

### *Swordfishing Fleet*

For the second consecutive year the swordfishing branch of the State's fishing activities shows a lessening of catch, and this in face of the fact that the fleet engaged was considered the largest on record. The weather at times was not all that could have been desired for the successful prosecution of the industry; the terrible gale of August 26 took its severe toll of lives and boats from this daring fleet; swordfish did not show on the fishing grounds to the westward of Georges bank (the in-shore grounds) in any such numbers as in the previous year; the fall catch of Massachusetts crafts in Nova Scotia waters was unusually light because of scarcity of fish — all these things combined to cut down the catch total below that of 1923.

But there was also a bright side. Prices ranged during the season from a high of 50 cents per pound for a few shipped fish, and a top figure of 37 cents per pound for fare lots, to a low figure of 16½ cents. This latter in itself, some years back, would have been considered high. The average price, ex-vessel, therefore, was even above the two previous years and so despite the reduced catch, the season as a whole cannot be considered as anything but successful.

The first arrival of swordfish at the Boston Fish Pier came on June 25, when two crafts landed a total of 119 fish, for which the dealers paid the fishermen 34 cents per pound. From then on, the fishery continued with the usual "come and go" of trips, there being no notably large fares during the season. Foggy weather was encountered for quite a spell and the fishermen reported that frequently the fish, instead of basking on the surface, were deep in the water, which naturally made fishing difficult.

Demand for swordfish continued active and insistent throughout the season and at no time was the market glutted. Some fine trips were recorded with resultant large stocks and shares, but generally speaking, to use a fisherman expression, "things went along about average."

The terrible storm of August 26 caught nearly the whole fleet out on the Georges fishing grounds. No less than six vessels were damaged, forced to give up their voyages and limp back to port; four crafts fell before the fury of the gale and failed to return to port, going down with their whole crews, some 18 souls. This disaster, coming so unexpectedly, took the heart out of the waning season. Quite a fleet, however, sought late fares in Nova Scotia waters, but here they found fish scarce and returned with small catches of large fish, so that the season was practically over soon after the middle of September.

The landings at the Boston Fish Pier were 10,581 fish, as against 13,438 the previous season, while shipments via steamer from Nova Scotia were 1,421, as against 3,046 in 1923. At Edgartown 400 fish were brought in, practically the



same amount as last year, while at New Bedford the total was about 1,100 as compared with 1,675 in 1923. Woods Hole, another favorite landing place, reported 500 fish as compared with 900 the previous year.

### *The Mackerel Fishery*

The mackerel catch of 1924 must justly be placed on a par with that of 1923, which was the greatest since 1887. Encouraged by the wonderfully successful fall fishing of the previous year, vessels of the seining fleet fared forth to southern waters during the latter part of March, the first to go, schooner Siletto, Captain Ralph Webber, getting away on the 24th. The southern seining fleet was not large, numbering less than 20 sail, the netting fleet was perhaps in excess of any previous year, well over 100 sail, the leaders of this latter fleet getting away early in April.

The first mackerel of the season to be landed were brought in at Cape May on April 7 by schooner Harvard, Captain Howard Tobey. The craft had but one barrel, the fish being small, and going three fish to a pound, being caught off Fenwick's Island in 32 fathoms of water. On April 10, steamer Orion, Captain John Dahlmar, arrived at Fulton Market, with the first fare of that port for the season, 35,000 pounds. The fish went from three-quarters of a pound to a pound in weight, and brought from 23 to 25 cents per pound, being caught off the Virginia capes, the landing being two days ahead of the first arrival the previous year.

From then on until late in May the seiners enjoyed one of their best seasons out south in recent years, while the netting fleet as a whole did poorly in comparison to some of the successes of recent springs. The seined fish went from 4 to a pound to 1 to 1¼ pounds each, while the netted fish weighed from 1½ to 2½ pounds per fish, prices at times falling as low as 8 cents per pound for the seined goods and 10 and 11 cents for the netted variety. Net mackerel in small lots at times stood the wholesalers 45 cents per pound when scarce.

The fish apparently moved rapidly northward and eastward, for at Chatham, on April 18, the trap took three tinker mackerel, the first of the season, the first catch here the previous year being one lone fish, ten days later. The Boston Fish Pier received its first fares of fresh mackerel direct from the fishing grounds when schooner Good Luck arrived on May 16 with 5,000 pounds of large fish taken some 60 miles southeast of the New York lightship.

The southern fleet, seiners and netters combined, had landed up to May 9, 13,200 barrels, against 6,400 barrels at the corresponding date the previous season, the bulk of the catch being small fish and tinkers. The total southern catch was about 20,000 barrels as compared with about 12,000 barrels the previous season. During the latter part of May some of the netters began to take fish off Provincetown, in Cape Cod Bay, also on Middle Bank and to the eastward as far as Portland. Catches from off this port to as far south as Block Island, mostly of small fish, by the smaller crafts of the seining fleet, showed clearly that there was a good body of fish on the shore grounds.

The Cape Shore catch was smaller than for many years. The fleet as a whole was later in arriving on these grounds and as the early catches were mostly of fish going about 1½ pounds it was thought that the large fish had gone by before the fleet began to operate; in fact the fleet struck no fish until it reached off Liscomb, N. S., and Beaver, N. S., the first fares being landed at Boston Fish Pier June 9 by the Nyoda, 56,000 pounds fresh, and the Lucia, 30,000 pounds fresh. The crafts came along in quick succession and the latter half of the fleet, with fares taken off Halifax, N. S., and to the eastward had nearly all large mackerel, thus seemingly showing that the schools of small fish were on ahead of the usual run large fish and that the latter had not gone by as had been supposed.

Following the Cape Shore season, the fleet somewhat augmented in size, operated mostly on local grounds from Block Island to Portland, but not as close in shore as in 1923; also in South Channel, off Chatham and on Georges. The fish taken were mostly those going from one-half pound to a pound in weight, although considerable of the catch was of the former weight, the market at times being

glutted and overburdened with this too-small sized fish. Frequently fish of this size and up to a pound apiece in weight went to the splitters and salters, in large trips and for days at a time at low prices, the fresh fish market and freezers being unable or unwilling to absorb or handle them.

Receipts came steadily week after week; at times the fleet were desisting from catching the half-pound fish. As the season advanced these smaller fish increased some in weight and showed considerable fat and good catches continued so that by August 15 the catch of fresh mackerel was over 61,000 barrels, or nearly double that of the 1923 fleet at the same date. Good catches continued until the end of the season on Middle Bank, the Maine coast, off Cape Cod and South Channel, more medium and large fish being taken as late summer and fall came in. A great many more mackerel were salted by the fleet than in 1923 and good prices were obtained on a brisk market. The seining fleet operated until into November, with poor success at the end. The fall netting fleet met with poor success although a large number engaged.

The Massachusetts catches of fresh and salted mackerel from December 1, 1923, to November 30, 1924, inclusive, and for the corresponding period of the two previous years were as follows:

	Dec.1, 1923 to Nov. 30, 1924	Dec. 1, 1922 to Nov. 30, 1923	Dec. 1, 1921 to Nov. 30, 1922
Salt mackerel (barrels)	11,000	3,864	2,749
Fresh mackerel (barrels)	101,954	121,000	50,203
	<hr/> 112,954	<hr/> 124,864	<hr/> 52,952

#### *Cape Shore Catches of Mackerel for Nine Years*

Year	Arrivals	Fresh Mackerel (Pounds)	Salt Mackerel (Barrels)
1924 . . . . .	24	996,000	854
1923 . . . . .	31	1,240,680	211
1922 . . . . .	48	1,353,900	2,344
1921 . . . . .	29	2,160,000	3,003
1920 . . . . .	30	1,290,000	3,217
1919 . . . . .	32	2,119,000	6,275
1918 . . . . .	38	1,689,000	7,558
1917 . . . . .	32	2,229,000	7,131
1916 . . . . .	24	1,161,000	3,718

#### *Salt Bank Codfishing*

This branch of the fisheries, which in the halcyon days of the 70's and 80's numbered more sail than any except the mackerel and Georges handline fleets, reached its lowest ebb this year when but two crafts pursued the fishery from beginning to end of the season (which lasts from late February or early March to late October), making the usual quota of two trips. One of these crafts went at dory handlining. Both vessels sold their fares at good prices and stocked well for the season.

A few crafts made one salt trip and then shifted to some other line of fishing. One or two others salted part of one or two of their early catches. A Boston steam trawler made one short salt trip, as has been the case for the past two seasons.

#### *Fresh Halibut Fleet*

With a catch but a quarter of a million pounds below the mark of 1923 in amount of fish landed, and in the resultant total gross stock for the season, the fresh halibut fleet of this year cannot well term its doings for 1924 anything short of successful. The drop in the season's financial receipts was due to lower average



prices than received during the preceding year. The total fleet catch was 4,638,872 pounds, as against 4,872,994 pounds in 1923.

The season was marked by an early getaway for several of the fleet which sailed in late January and February and fished to the eastward. The fleet at the height of operations in mid-summer numbered 28 sail, about the same number as last year. The season developed marked fluctuation in the size of fares landed. Several trips were in the unusually large class, while too there were more very small fares than has been common in the past five years — "broken trips" the fishermen call them, and these served to keep down the fleet catch total.

The season produced the record-breaking fresh halibut trip of all time as far as stock and share are concerned. The fare was large, but many larger have been landed. The lucky craft, Schooner Ingomar, Captain Carl Olson, for several seasons one of the headliners of the fleet, arrived at Boston on May 26 and was fortunate in striking a bare market for halibut so that her trip sold for 23 cents per pound for white fish, 20 cents for gray and 16 cents for "chickens." The vessel weighed off 86,000 pounds of halibut, and a few thousand pounds of salt cod, making a stock of \$15,036 on which each of the crew profited to the extent of \$412. The craft was gone but 21 days and secured her fare on Grand Bank.

### *The Gill Netting Fleet*

Despite many adversities this little fleet of power-driven crafts continues to operate, but with varying success, on the inshore fishing grounds. At no time during the season were more than ten boats operated and often the fleet was not more than half that number. At times in the winter the whole fleet was laid up for days at a time. This year a few of the boats tried the experiment of making it nearly a whole year fishery. This fall the fleet, about 10 in number, again began operations and up to November 30 had met with better success than last year. The fleet catch for the season was 4,978,600 pounds.

### *Cape Cod Activities*

At Provincetown the freezers in operation (five in number), reported a good winter business and practically cleaned up their stocks. During the spring there was an extra large run of herring in the traps, which proved fortunate for the freezers and also for the large fresh fishing fleet, which was thus enabled to secure fresh bait.

The flounder otter trawling fleet had a good winter season, but at about the middle of the cold spell, part of the crafts, attracted by the success attained by the scallop dredgers, shifted over to that line of operation. This fishery for sea scallops as a separate line is practically a new industry to be pursued in any proportions in the waters in this vicinity.

The run of mackerel started early and held up well throughout the whole season, some catches being made in the late fall. On several days during the summer the traps made unusually large hauls. The fish taken ran from small size to mediums, with a few large ones mixed in. The small went 3 fish to  $1\frac{1}{4}$  pounds and  $1\frac{1}{2}$  pounds. As a general thing the mediums and tinkers were shipped to the New York and Boston market, fresh, while the small were put in the freezers, except when good prices warranted shipment.

The mackerel netting fleet, including many local boats, as well as several which returned early from out South discouraged with the poor fishing out that way, did unusually well this spring and some remarkable catches were made. Fishing authorities at Provincetown say it was the biggest spring mackerel net fishery for fully 25 years. The fish were taken all the way from a few miles off Race Point to Middle Bank, and it is averred by those who know, that had the entire southern netting fleet fished in these waters instead of going way out South they would not have met with the poor success experienced in the waters South.

The months of April and May produced a good run of herring. Whiting were late in coming and were not plentiful. Butterfish were very scarce. Mackerel



were plentiful in July, August and September, and prices averaged low. Summer squid came late, in August and September.

At Chatham the traps did better than the previous year. The fish came early, and during May, June and early July good catches of mackerel were made, although not as many large mackerel were caught as during the run of 1923, and lower prices were recorded. The trap takings of squid were three times as great as the previous year, much of the catch being shipped fresh to Boston for bait for the fishing fleet, bringing the good price of 4 cents per pound at the local wharf. The catch of butterfish was also better than last year and fancy prices were recorded, the fish selling on a season's range of 10 to 22 cents per pound.

The mackerel netters did not fare as well as the previous season and less large mackerel were caught in the gill nets. The fleet operating off Hyannis did better than that at Chatham, this owing to the fact that the fish went wide up the shore and did not come in the bay.

At Chatham the lobster catch was very short, being estimated up to the middle of July at not over one-fifth of the ordinary catch. No whiting were taken up to the middle of July.

At Barnstable the traps did not do much at the start of the season, but took good hauls of small and tinker mackerel during the middle of the season. The catch of herring was reported fair, with some whiting and squid.

At Chatham some of the fishermen were frankly worried over scallop and lobster conditions.

#### *Buzzards Bay Fisheries*

Trap fishing at Buzzards Bay this last year was not up to last year's figures, one reason being that the traps were nearly all blown down in the unusually severe gale of last August. After this only a few were reset and it took a long time to get them again in operation. It is very interesting to note, in the lack of such report for a number of years, that mackerel were again schooling and in large numbers on the north shores of the Bay. Quahaugs were found in large beds on the south shore and well to the westward. Twenty boats from Cuttyhunk were dredging and landing thousands of bushels.

Scup fishing showed a gratifying improvement over last season both in the handline and in the trap fishery. The traps did very poorly on mackerel, while handline fishing for these fish was very good late in the fall. At Woods Hole the boats of the shore fleet brought in about 500 swordfish in number and also landed 500 barrels of fresh mackerel during the season. But taken as a whole the fishing in the bay during the year was a failure, even worse than the previous year. The few traps caught practically little and the hook and line fishermen averaged not heavily. There were a few tautog caught this fall.

At New Bedford during the season 1,100 swordfish were landed as against 1,675 last year. Mackerel were quite scarce, there being about 1,200 to 1,400 barrels landed at that port.

A considerable amount of flounders and flatfish were also landed at New Bedford during the year by the Nantucket dragging fleet, in cases where there were broken trips or weather preventing them from running through direct to New York. This part of the business seems to be increasing as the fleet grows.

Ground fish of many kinds are not being caught in these waters, nor have they for some time. The only cod or haddock landed at New Bedford were by the flounder draggers.

#### *Martha's Vineyard*

The fishing season at Martha's Vineyard, as far as the local fleet was concerned, did not, according to the fishermen, begin to measure up to the success of the previous year. "A poor season," is the general expression. Boats engaged in mackerel netting made from poor to fair catches in the spring, being handicapped by considerable windy weather. Swordfishing inshore was very poor, practically few fish appearing in the near-by waters where last year the boats operated with marked success. This applies to the western end of the island.

Otter trawling for flounders inshore was very poor. Fish were very scarce

and what were taken were generally small. The off-shore fishing during the spring and summer was good.

Mackerel fishing around the island was poor; some fish schooled off-shore, but in small pods which were very wild.

The traps caught rather more scup, sea bass, pollock, etc., than they have in any spring for the past eight years. The spring run of mackerel was light, but during the latter part of June there was a good run of small and tinker mackerel. No summer fish, such as flukes, squeteague and bonito were taken and there was a small run of butterfish. Taking it all in all the traps did not any more than pay expenses.

The spring run of lobsters was light. School lobsters struck rather late, about July 1, with consequent light catches. A heavy gale on August 26 destroyed practically all the lobster fishing gear, even that set in as deep as 20 fathoms of water, which was quite a severe blow to the fishermen. What gear was fished after that did very well as lobsters were plenty and prices averaged up fairly well.

Alewives were not plenty. The catch was about the same as 1923, around 3,000 barrels. For the second year in succession there was no run of late fish, the season at Mattakeesett Creek ending soon after May 20, and there being no second run from June 5 to 15 as has been the case in many years before.

At Edgartown and vicinity flounders as a rule were scarce. A large school of yellow tails struck in south of the Vineyard about the middle of January and stayed until the latter part of February. This fishery however, was carried on by the larger crafts of the flounder fleet which marketed their catches direct at New York. Mackerel were rather scarce. The shore netting fleet landed about 500 barrels here, but none after the first of June. Swordfish were fairly plentiful inshore and the shore boats landed about 400 here. No bluefish were taken. Sea bass were very scarce. Scup were fairly plentiful during August and September, and three or four boats with hand lines landed about 100 barrels.

Quahaugs were very plentiful and the catch from April 1 to November 1 was about 6,000 barrels, two-thirds of this being of the "little neck" size. Scallops were scarce in January, February and March. The fall season opened here on November 1 with scallops fairly plentiful. The catch for November and December will probably aggregate from 12,000 to 15,000 gallons.

### *Nantucket Fisheries*

The otter trawl fishing for flounders, which has its headquarters at Nantucket, has enjoyed a very good year, even somewhat better than the previous one; also there has been a good run of codfish and haddock on the Nantucket Shoals grounds. This, owing to good prices at the New York market, has added to the prosperity of this busy fleet of boats.

There were packed and shipped from Nantucket, mostly to the New York market, since December 1, 1923, up to and including November 30, 1924, 31,060 barrels of fish, averaging from 200 to 225 pounds net weight, and fully if not more than this quantity has been taken to the New York market direct from these Nantucket shoal grounds. Less than one-third of this quantity landed at Nantucket was cod and haddock, and the rest flounders.

Fluke, or summer flounder, was in poor receipt, the fishery being not nearly as good as last year, the small fleet engaged not seeming to be able to locate them on the old grounds.

The traps had a very poor season, the catch of such fish as mackerel, bonito, scup, weakfish, etc., being hardly enough to supply the local market demand during the summer.

The season on lobsters has not been very good, in fact way below last year, which was the best one for a number of years.

The local market absorbed the entire catch of soft clams. A better season on quahaugs is noted than last year, there being shipped from the Island 4,110 barrels. There were more caught on the off-shore or outside grounds than last year as the fishermen found a spot where they did extra well for about a month this spring.



Only two or three boats engaged in swordfishing from this port and they did poorly. Around the Island the catch of mackerel was very poor.

The season on scallops has been somewhat better than last. October's landings were met with good prices, from \$2.75 to \$3.50 a gallon, and in November from \$3.50 to \$4.50 per gallon. During the latter part of November the fishery was beginning to show some signs of letting up. It is estimated that there was shipped from the Island up to November 30, 1,500 gallons more than last year. These were all caught in the harbor of Nantucket. As yet the fishermen have not been to Tuckernuck or Muskeget.

### *Boston Fishing Activities*

Although the fish receipts of Boston direct from the fishing fleet for the year were without doubt the largest on record at this port, still the average prices for the various species of fish landed were below the price-record year of 1923, therefore the "perfect year" for the fishermen and fish dealers has not arrived.

Prices for the year, however, were not small or below the average and on the whole, considering the volume of catch and the condition of trade, must be looked upon as satisfactory. Certain it is the fishing fleet has given evidence of its ability to land an amount of fish to meet at any time the demands of any reasonable increase in trade. Analyzing the Boston catch it appears that there was a decrease in the catch of codfish amounting to about three million pounds. Haddock were in larger receipt by a little over one million pounds than the previous year, while "serod" haddock (that is fish below  $2\frac{1}{2}$  pounds in weight) were six million pounds in excess of the previous year. Hake are credited with an increase of one and one-half million pounds, while pollock fell short over a million pounds, the receipts of cusk being practically the same as last year. One of the most gratifying increases of the year is noted in the catch of halibut, the total being a million pounds ahead of 1923, part of this gain no doubt being attributable to the fact that the landings at Portland, Me., fell to less than a half million pounds from the year before, the vessels which had been landing there seeking the Boston market in preference. Fresh mackerel were but 400,000 pounds short in receipt of the record breaking year of 1923.

The figures for the following table are this year, as has been the case in many previous years, furnished the Division by Mr. Fred F. Dimick, secretary of the Boston Fish Bureau, whose standing in the fish statistical world is unquestioned. Mr. Dimick also, in the following brief paragraphs, gives his resumé of the fish season at the Boston Fish Pier, which naturally will be of marked interest:

Mr. Dimick says:

"The season of 1924 will go on record as a fairly satisfactory one in the fresh fish trade, but the cost of doing business is large, and profits have been limited. The margin of profit in the wholesale trade is small, and there is much competition. The demand for haddock has been greatly strengthened as a large quantity of these fish are now disposed of for the purpose of making fillets, and the receipts of haddock comprise about 50 per cent of the receipts of fish direct from the fishing fleet.

"The fishing vessels have not made as good stocks as a rule as the previous year as the price of haddock ruled low much of the time. The operations of the steam trawlers have been on a moderate scale.

"The catch of fish on Cape Cod has been light. The spring catch of herring was good and has been all cleaned up. The catch of whiting was only about half the average. The catch of mackerel was light.

"Some vessels that have engaged in flounder dragging have been quite successful, and a number of new vessels are entering that branch of fishing.

"The receipts of fresh fish from Canada have been light, especially of swordfish, and that branch of the business has not been very profitable."



*Receipts of Fish at Boston Direct from the Fishing Fleet from December 1, 1923 to  
December 1, 1924*

	Pounds
Large Codfish . . . . .	23,764,346
Market Codfish . . . . .	11,623,566
Scrod Cod . . . . .	194,565
Haddock . . . . .	56,204,321
Haddock Scrod . . . . .	9,031,093
Large Hake . . . . .	349,187
Small Hake . . . . .	5,196,581
Pollock . . . . .	1,980,750
Cusk . . . . .	1,744,348
Halibut . . . . .	4,008,204
Fresh Mackerel . . . . .	6,231,784
Miscellaneous . . . . .	6,533,070
<b>Total . . . . .</b>	<b>126,861,815</b>

*The Gloucester Fisheries*

In accord with the general upward fisheries trend, Gloucester must be reckoned in as advancing in the fisheries line. This is the third year in which this oldest fishing port of the new world has demonstrated, without fear of contradiction, that it is again determined to take its place "in the sun." With the total landings of sixty-five million pounds of fish direct at her wharves, this grizzled veteran whose outer portal is guarded by Mother Ann, continues to keep near the forefront of the fishing industry.

The landings show a gratifying increase of nearly three million pounds over last year and also seven million pounds over the previous year. Gloucester's fishing business is now on a stable basis. Its vessels come and go and its dealers operate with confidence. There is much to be grateful for and there is much to be expected from the future.

Referring to last year, it is interesting to note that the receipts of fresh codfish were increased about two million pounds and fresh haddock about one million pounds. As these fish go to the splitters and curers to be made into salt fish the gain is notable. In most every line this oldest established fishing port in the United States is gaining.

The "quality fish idea," which this place was one of the first to subscribe to, believe in, and live up to, is having its effect and is helping its merchants to place the city's fish products on the market in increased quantity.

Prices ex-vessel both for fish of the salted sort and also fresh, ranged considerably higher than in 1923, which was considered a satisfactory year. Signs seem to point to an increase in the use of salt fish by the consumer. If this is so Gloucester will naturally profit accordingly.

The following table gives the landings of fish at this port from December 1, 1923 to November 30, 1924.

	Pounds
Salt Cod . . . . .	6,181,529
Fresh Cod . . . . .	19,913,148
Halibut . . . . .	154,951
Haddock . . . . .	11,227,325
Hake . . . . .	1,956,765
Cusk . . . . .	995,531
Pollock . . . . .	3,141,736
Flitched Halibut . . . . .	18,082
Not product of American Fisheries . . . . .	8,562,207
<b>Total . . . . .</b>	<b>52,151,274</b>

(This table continued on page 47)

Fresh Mackerel (Pounds) . . . . .	2,959,761
Salt Mackerel (Barrels) . . . . .	9,551
Fresh Herring (Pounds) . . . . .	2,170,350
Salt Herring (Barreled) . . . . .	228
Salt Bulk Herring (Barrels) . . . . .	7,357
Cured Fish (Quintals) . . . . .	25,424
Miscellaneous (Pounds) . . . . .	1,108,242

Total, December 1, 1923 to November 30, 1924, 64,921,159 pounds.

### SHORE FISHERIES

Owing to the necessity of curtailing the bulk and costs of annual reports the tables of statistics hitherto published yearly in the Appendix are omitted. The totals alone are given of the returns from the shore net and pound fisheries for 1924.

Number of men engaged, 256; number of boats, 221; value of boats, \$69,448.00; number of fish pounds, 96; value of fish pounds, \$135,200.00; number of nets, 604; value of nets, \$7,825.00; catch in pounds:

Alewives, 391,745	Sea bass, 4,128
Bluefish, 16,031	Sea herring, 535,848
Flounders, 174,868	Shad, 55,945
Mackerel, 3,279,650	Squeteague, 1,360
Menhaden, 135,739	Striped bass, 983
Pollock, 62,416	Squid, 928,335
Salmon, 18	Tautog, 16,567
Scup, 109,533	Other edible or bait species, 7,113,344

Total pounds, 12,826,510; total value, \$286,241.21.

### THE LOBSTER FISHERY

It seems evident at this writing that the lobster fishery, following the unexpectedly poor results of last season, will show a slight increase in catch in spite of the fact that questionnaires sent to various wardens in the lobster fishing sections, as well as to men competent to judge, indicated a decline in this fishery. The catch of 1921 was the largest in number since the 9-inch legal length law went into effect in 1907, and also the largest of any year since 1890. The reversal of form had been sudden and brings strongly to the front the idea that if the lobster fisheries of the State are to be restored to former vigor, action may be necessary. It is an omen that even among the fishermen themselves some of them are advocating a period of cessation of fishing. Naturally it is not to be expected that all lobster fishermen will coincide with this view, but it appears that conditions are such as to call for remedial measures.

Tabulation of replies to questionnaires sent out by this Division show that the catch of this year has been below that of last year in seven sections; above in one, and average in five; also that favorable weather was met with excepting the terrific storm of late August when pots and gear suffered to a very large extent in most lobster fishing sections. Replies to the questionnaires also bring out the points that the number of short lobsters taken in the traps as compared with the past few years was apparently about the average; also that less seed lobsters were taken and that the general run of lobsters caught of marketable size averaged smaller than usual.

During the spring, from Nova Scotia shipments, there were seized at Boston, 13,628 shorts and 117 egg bearing lobsters, all of which were distributed by Division wardens on favorable lobster locations along the whole state coast.

The totals of the tabulation of the returns of the year's fishing, required of the lobstermen by law, follow. The complete tabulation, hitherto published in detail, is discontinued by reason of the necessity of curtailing printing expenses.

The following data is compiled from reports received from the lobstermen, to and including October 20, 1924:

Number of men engaged in the fishery 570; number of boats, 772; value of boats, \$182,270.00; number of pots used, 39,744; value of pots, \$104,079.50; number of lobsters taken, 1,076,666; pounds of lobsters, 1,614,999; value of lobsters, \$423,916.62; number of egg-bearing lobsters taken and returned to the waters, 15,984.

As required by Chapter 130, Section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1924 was 820.

#### BOUNTIES ON SEALS

The following towns were reimbursed by the Commonwealth for bounties paid on seals under Chapter 130, General Laws, Section 155. Barnstable, \$48; Cohasset, \$6; Duxbury, \$50; Hyannis, \$4; Ipswich, \$2; Newburyport, \$2; Plymouth, \$6; Provincetown, \$2; Revere, \$6; Rowley, \$4; Salisbury, \$2; Wareham, \$4; fees to treasurers, \$34.

#### MOLLUSK FISHERIES

The beginning of an awakened interest in the shellfish situation is shown in the convention of selectmen of the shore towns and representatives of the industry which met October 2, 1924, under the auspices of the Cape Cod Chamber of Commerce, with the purpose of forming a co-operative organization to regulate the shellfish fisheries and industry.

As a result of the meeting a committee was appointed, consisting of members designated by the selectmen of the coast towns, to draft a plan of organization and operation, and report to the Chamber of Commerce previous to the time of the annual town meetings, in order that a complete working program might be presented to each town. This committee met on November 1, organized, and adopted a program of work.

The annual general survey of the mollusk fisheries was made by the biological department and wardens, details of which are in the office files. It shows that conditions in general have changed but little since last year; but any change is in the way of improvement in certain localities.

#### *Clam*

Reports from persons engaged in the clam industry show that the production in nearly all sections of the coast was at least average, and in many cases extremely good.

#### *Scallop*

The 1923-24 season averaged up, on the whole, as only a fair year. Scallops brought from \$3 to \$5 per gallon, and were rather scarce in most sections.

#### *Quahaug*

A fair season in general has been reported for the quahaug fishery. In Wareham the industry is rather increasing. At Nantucket there was a very good set of seed for the summer of 1924, and in most other localities the set is said to be fair or better and the beds in excellent condition. On the Cape, quahaugs brought a higher price than other years; at Buzzards Bay they were a trifle lower, while at Swansea and Somerset the price has remained about the same for the last six years.

#### *Oyster*

The oyster industry in Massachusetts remains about the same. Except for the localities where oyster planting has ceased, the industry is carried on successfully in a small way. Only a fair season was reported for 1924, though the production was in some cases considerably greater than that of the previous year. Falmouth, for example, produced 3,100 barrels this year against 1,200 in 1923. The prices in general ranged considerably higher this year than for some time.



## SHAD

The report on the matter of protecting the shad fishery in Palmer River, as ordered by Chapter 40, Resolves of 1923, was made by the Commissioner of Conservation to the General Court of 1924.

It resulted in the enactment of Chapter 104, Acts of 1924. By this law the shad are given free and unobstructed passage the entire length of the river to the spawning grounds at the head of the Palmer River on certain days during the spawning season. The enactment of the Massachusetts law automatically put the Rhode Island law into effect, and uniform regulations are provided in both states for five years from March 1, 1925.

## ALEWIFE

The run of alewives in 1924 in many of the streams was somewhat better than the average, and taken as a whole, the production was fairly satisfactory.

The marketing of the alewives caught this season was recorded wherever possible. Prices ranged from 75 cents to \$1.50. At Herring River, Harwich, 700 barrels were caught and used for scales only in the manufacture of artificial pearls. After scaling, the fish were given away for fertilizer. At East Wareham the herring industry is growing to great proportions, and a special curing process used, by which is produced a product called "capchonkis," very popular with the Jewish trade, with a big market for them in New York and Chicago. The alewife industry, from the standpoint of a commercial valuation, begins to show a marked increase, whereas in 1921 it showed a marked deflation, due to the abrupt curtailment of the abnormally high prices once offered for the scales.

Work on behalf of the alewife fishery consisted of fishway work; observations on the alewife runs through the fishways,—for which see the section of this report on fishways; stocking experiments; and the annual check-up of the industry.

*Transplanting.* — Adult alewives were planted in the headwaters of the Taunton River system, this being the fourth year, and in the Ipswich River, as follows:

297 alewives from the East Taunton fishway, planted in Lake Nippenicket, Bridgewater;

416 alewives from Barker's River, Pembroke, planted in Lake Monponsett, Halifax;

1,750 alewives from Chebacco Brook, Essex, planted in Ipswich River.

Watch was kept for the return of alewives in streams, the headwaters of which have recently been stocked. The unusually large run at the East Taunton fishway seemed to indicate that some of the fish in that run were the result of this work, this being the year in which some of the resulting young fish would be expected to run to the breeding grounds, and in so doing would be obliged to ascend this fishway. Alewives, presumably also the result of plantings, appeared for the first time in many years in the fishway of the Jenkins Leatherboard Company on the Town River and in the fishway of the Stanley Works.

On different occasions during the summer Lake Nippenicket and Monponsett Lake, Halifax, were visited, and the progress of the young alewives hatched from the adults planted, was noted. The dams on the system were also visited during the fall and there was found, in most cases, to be a clear passage for the young alewives on their return to sea.

Respectfully submitted,

WILLIAM C. ADAMS, *Director.*

## APPENDIX

RECOMMENDATIONS TO BE CONTAINED IN THE FIFTY-NINTH ANNUAL REPORT OF  
THE DIVISION OF FISHERIES AND GAME FOR THE YEAR 1924

The Director respectfully recommends the passage of laws designed to accomplish the following purposes:

1. *Relative to Sporting and Trapping Licenses.* — The budget commission has taken the position that it will not recommend increases in the appropriations for the Division of Fisheries and Game until the revenues exceed the present appropriations. Last year (1923), the total sum appropriated was \$215,650. The total amount of the income from revenues and other sources was \$189,535.79. The increasing demands of law enforcement and artificial propagation in order to keep the supply of wild life at least equal to the present drain through hunting, fishing, destruction by vermin, and the encroachments of civilization, will require from year to year increases in our appropriation over and above the 1923 figures. The only course open is to increase the license fees and to devise ways and means of decreasing the annual cost of distributing the licenses. While economies of operation are being constantly worked out, the ground has been so thoroughly covered that future improvement is not likely to be an important factor in offsetting failure to receive reasonable annual increases in appropriations.

2. *Relative to Search and Seizure under the Law respecting Fish and Game.* — Under existing law no officer of the Division can obtain from any of our judges a right to search a dwelling house in order to obtain evidence of a violation of the fish and game laws. Short lobsters may be taken, and fish, birds and quadrupeds illegally killed, and if they can be gotten into a dwelling house they are safe from pursuit and the violators cannot be apprehended with their quarry. Unless our officers can have the use of search warrants under such conditions, with suitable safeguards to prevent any unreasonable violations of the right of privacy, it will continue to be extremely difficult, if not impossible, to stop many persistent violations of the fish and game laws.

3. *Relative to Ruffed Grouse.* — The reports from all over the Commonwealth prior to the time that these recommendations must be filed indicate a scarcity of grouse in certain sections. The shooting season was so curtailed by reason of drought conditions that there was not the opportunity for as full an investigation based on actual field reports as was desirable. Under our practices, the open seasons, with the exception of pheasants, are determined by the Legislature. In order to cover the situation between now and the time of consideration by the Legislature, we are including this recommendation. If subsequent reports show no legislation necessary, this recommendation will be withdrawn in due course.

4. *Providing for a Close Season on Quail in Certain Counties.* — The stock of wild quail in certain counties is not sufficient to warrant the maintenance of an open season. The following legislation is in line with the policy of past years to keep the season closed in all such counties.

5. *Relative to Muskrats.* — The protection and increase of the fur-bearing animals, particularly those which are more or less harmless, is highly desirable. The value of the annual catch of fur is substantial and affords some occupation for a number of our citizens. The muskrat is the most valuable fur animal in the Commonwealth. Because of the high price of pelts, it has been reduced to the verge of extinction in many localities, and nowhere can be considered abundant. It should be given an opportunity to re-establish itself, while at the same time according to property owners (particularly cranberry growers), the right at all times to protect property against destructive operations by these animals.

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The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1925

*Mass.* DEPARTMENT OF CONSERVATION *Division of*  
*fisheries and game*



PUBLICATION OF THIS DOCUMENT APPROVED BY THE  
COMMISSION ON ADMINISTRATION AND FINANCE



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## The Commonwealth of Massachusetts

The Director of Fisheries and Game herewith presents the sixtieth annual report.

### GENERAL CONSIDERATIONS

When making the annual survey of wild life conditions in a given State it has been customary to report on the status and future possibilities of growth of the stock located within the boundaries of that particular State, giving little consideration to the national and international aspects of the problem, or the interdependence of the several States as bearing on the net result.

There is no State in the Union which can practice this policy of isolation without endangering the welfare of the residents of that State for many generations to come. This is particularly true of Massachusetts. Ours is a small State with a great population. Its remotest sections are now accessible with good roads. The collective affairs of civilization have so dismantled its forests, polluted its waters, and rendered sterile large areas upon which formerly the big game animals of the country roamed at will, that no longer can it be classed as a big game State.

The fact that the moose, panther, black bear, wild turkey, and other species can not abide here has not caused our people to lose interest in these species wherever found. There are still regions in the country sufficiently untouched by man, so that if a portion of them can be set aside as National or State ranges, practically all existing species of our big game and the larger game birds can not only be preserved from extinction, but increased in numbers to the point where they will continue to supply a fair volume of sport as well as being always available for inspection and study by those who do not care to hunt. These regions lie mostly west of the Mississippi River. The Federal government has taken steps to cause certain wild life sanctuaries to be established; and certain of the Western States have taken similar action on land not under Federal control. But it is not reasonable to expect these Western States, of vast size (as compared to our small State) and with far-flung, sparse populations (compared to the dense population of our State), to bear all of the financial burden of providing and administering such refuges. The departments of the Federal government having to do with wild life conservation are performing a splendid service on behalf of all the people, but the funds at their disposal are totally inadequate. The same is true in those Western States where the remaining unspoiled habitat of the big game is found. Upon looking at this question in the light of the developments of the next hundred years, it is evident that it is of as great concern to the people of our State whether the grizzly bear and the antelope are to become extinct as it is to the people occupying the States where the remnants of these animals are now found. Thousands of our people in years to come will want to see these magnificent animals, and it should be our concern to take part in any activities, national or regional, having to do with the perpetuation and increasing of these species, and to assume our share of the financial burden.

The case of the migratory wild fowl is even more in point. Except for our native black duck we are entirely dependent on what takes place in other States and in Canada as to whether any of these birds will visit our State. When investigations now being made by the Federal government are completed, it will undoubtedly be apparent that Mexico, the Central American and South American States are also inseparably a part of the grand scheme of things. Twice a year we observe the inspiring phenomenon of a great variety of migratory birds drifting over the surface of our State while proceeding to or from the breeding grounds. In some instances we do not know whence they come. All we know is that somewhere, in regions outside of our State, they have tarried during the winter. In the following late summer and fall, clear through to early winter, we observe the return movement. The birds come to us from remote breeding grounds, some of them shrouded in mystery. But whether they come or not depends entirely on what takes place on the breeding and wintering grounds, and we, inside the boundaries of our small State, can do little or nothing to help control or direct the destinies of these birds—except in so far as we may restrain ourselves from taking them while they are within our borders.

We are just beginning to realize that the policies of fifty years ago, which simply sought to bring back the vanishing supply of migratory birds through the expedient of prohibiting the taking of them, has been a mistaken policy. We are just realizing that other factors have been at work far more deadly than the gun. These factors can be grouped under the term "civilization." They have destroyed our forests, drained our swamps, polluted our waters, and settled up the country, resulting in the *permanent* destruction of vast breeding and feeding areas of these migratory birds. Every year sees further encroachments upon the breeding grounds of our native black duck. The same things are occurring in respect to all the other species of wild fowl which come to our State during a given year. By reason of the newness of the country, again it is found that the principal breeding and feeding areas lie in the great States in the north central and western parts. Our duty is to see that these areas are preserved and that others which have been destroyed are restored wherever possible. It is idle to talk of maintaining the present supply of migratory wild life and to build it up, while at the same time sitting idly by and permitting these producing plants to be dismantled and destroyed one after another.

An inspection of the map of North America shows that during the winter these migratory birds concentrate in the narrow strip of country to the north of the southern boundary of the United States. Here in times past they have congregated in unbelievable numbers. But here again the hand of man is against wild life, for the reason that these natural wintering areas are being drained, and the possibilities of the regions for sustaining large concentrations of birds are being rapidly removed. These areas are our natural storage warehouses, in which stay the output of the breeding areas of the preceding summer, and if they are removed, the output from the producing plants will be destroyed. After all is said and done, the maintenance of this national asset calls for the application of fundamental business practices. It is not a matter of sentiment, and there is no mystery surrounding the problem. The people of our State cannot hold aloof from assuming their share of moral and financial responsibility in the application of those business practices. While the work should be under the Federal government in order to make certain of a national basis of action, nevertheless every State must assume its full share of the responsibilities. A pronounced decline in the numbers of birds would most quickly be felt in such purely migratory States as ours. But the final chapter of destruction, if it must come to that, will be written in the States where now the producing plants and storage areas are still to be found. Again it is of as much importance to the people of our State as it is to the residents of Minnesota, North Dakota and South Dakota, Nebraska and Utah that these producing plants be preserved. It is likewise as important to our people as it is to the residents of Louisiana, Arkansas, Florida and South Carolina that the storage areas be preserved.

All that has been said with respect to the big game in the west and migratory birds is equally applicable to many phases of our commercial fisheries. The time



has gone by when each State can content itself with taking the maximum numbers of such fish as annually visit these shores. Long ago Congress appreciated these facts and established Federal agencies to work with the coastal States on both oceans and the Gulf, in order that these fisheries might be at all times considered in their entirety, rather than from the point of view of any one particular region. The life history and migrations should be studied by some central agency within the Federal government, in order to avoid duplication of effort in the several States and to make certain that the most complete survey is made. The same can be said of sanitary methods of controlling, of handling and marketing the products. There is greater need than ever before of joint participation by the several States in all these activities. This should be either under the guidance of the Federal government or through councils in which all States are represented when considering such species in order that their entire range may be under consideration. The foregoing is equally true where the Dominion of Canada is concerned. All of this is immediately apparent when we realize that in our State is located the greatest salt cured fish market in the world, and the largest fresh fish market in the United States — all handling salt-water fish.

#### PERSONNEL

There were no changes in personnel.

#### FINANCES

	Appropriations	Expenditures	Balances
For salaries and maintenance . . . . .	\$203,690 00	\$201,999 08	\$1,690 92
For special purposes . . . . .	—	—	—
Available from 1924 balances . . . . .	723 75	721 26	2 49
	<hr/>	<hr/>	<hr/>
	\$204,413 75	\$202,720 34	\$1,693 41
Returned to the general treasury <sup>1</sup> . . . . .			\$1,693 41

The revenue turned into the State Treasury was: for license fees (details below), \$169,638.35; rent at hatcheries and game farms, \$181.00; sale of game tags, \$44.00; sales of forfeited goods (guns, \$65.00, pelts, \$11.40), \$76.40; lease of Chilmark Pond, \$75.00; sale of warden's badge, \$1.00; lease of clam flats, \$10.00; sale of gravel, \$2.85; cash overpayment, 25 cents; total, \$170,028.85.

#### *Receipts in Detail of Licenses*

	Total Number issued	Gross Value	Fees to Clerks	Net Return to State
Combination licenses . . . . .	41,777	\$86,946 00	\$10,358 95	\$76,587 05
Hunting licenses . . . . .	39,272	56,155 00	9,803 80	46,351 20
Fishing licenses . . . . .	53,924	59,134 00	13,329 00	45,805 00
Lobster licenses . . . . .	1,095	1,095 00	164 25	930 75
	<hr/>	<hr/>	<hr/>	<hr/>
	136,068	\$203,330 00	\$33,656 00	\$169,674 00*
Adjustment of previous overpayments . . . . .				35 65
				<hr/>
				\$169,638 35

The enactment of a law eliminating the separate hunting and fishing licenses and substituting a straight sporting license at a slightly larger fee will result in an increase in the amount turned into the State Treasury from this source after January 1, 1926. A two-fold object is accomplished by this law — it not only increases the revenue but also it establishes trapping on a commercial basis, apart from the sporting activities of hunting and fishing.

\*The difference of \$35.65 between the total received for licenses above and in the preceding table is due to overpayments previously made and deducted on 1925 remittances.

The sporting licenses will cost: resident, \$2.25; non-resident, \$15.25 (\$5.25 to certain real estate holders, club members and fox hunters); alien, \$15.25. The schedule for the various classes of trapping licenses is the same as above, except that minor trappers will pay 75 cents instead of 25 cents. Also, duplicate licenses will cost 50 cents where formerly they were issued without charge. The greatest increase in cost comes on the fishermen; but this is not an unfair arrangement, for it is a fact that from the establishment of this department in 1865 to date, much more money has been spent on the propagation of fish than on the propagation of game. Between 1909 and 1919, the hunters paid into the Treasury over \$500,000; the fishermen, nothing. From 1920 to 1924, though the hunters paid larger fees than the fishermen, about \$100,000 more was expended on fish production than on game production. The present sporting license promises to more equably divide the burden, and the time has come when the sportsmen themselves realize that if they are to have more sport they must make a larger contribution. While it is true that the license fees are not directly at the disposal of this Division, nevertheless the amount turned in from this source is taken into consideration by the General Court when making appropriations.

It is believed that the proceeds from the sporting licenses should be used to finance the recreational side of the work of this Division, that is to say, what is done for the hunter and the fresh-water angler. The work with the commercial fisheries should be financed either from revenues contributed by the commercial fisheries, or by a direct appropriation out of the general funds. The commercial fisheries have to do with the production of a valuable food supply, and in this respect such appropriation out of the general funds would be in line with the assistance that is now given to agriculture.

The tendency in national and State finances is to make the several departments of the government self-supporting in so far as practicable. The cost of operating the Division may properly be divided into two parts: (1), that which relates to the commercial fisheries; and (2), that which relates to protection and propagation of game and fresh-water fish for sporting purposes.

Offsetting the expenditure of \$16,576\* on the commercial fisheries, revenues from such fisheries amounting to \$1,015.75\*\* were turned into the State Treasury. The remaining amount of \$15,560.25 was contributed out of the general tax levy.

Offsetting the sum of \$185,362 spent for the maintenance of the recreational activities, revenues (mostly from hunting and fishing license fees) amounting to \$169,013.10 were turned into the State Treasury, leaving \$16,348.90 contributed out of the general tax levy. In other words, the license fees fell short by the last-named amount of financing the work of the Division on its recreational side.

#### CONFERENCES WITHIN THE STATE

The regular annual conference with the sporting fraternity, land owners and others interested in wild life was held in Boston on January 14.

With the purpose of bringing about closer relationship between the commercial fisheries interests and this Division, conferences were held on June 12 and July 24 — for account of which see "Marine Fisheries."

#### ACTIVITIES OUTSIDE THE STATE

The Director has participated in the nation-wide activities for the conservation of fish and game by attendance at the following gatherings:

National Game Conference of the American Game Protective Association December 8-9, 1924, in New York City.

\*This sum is arrived at by lumping the following items: expenses of boat, \$253; smelt work, \$265; lobster work, \$710; one-fifth the salaries and operating expenses of the wardens patrolling the shore districts, \$5,087; alewife and fishway work, \$757; inspection of fresh food fish, \$9,504.

\*\*Lease of Chilmark Pond, \$75; lease of clam flats, \$10; fees from lobster licenses, \$930.75.



Annual meeting in Washington December 10 of the Advisory Board to the U. S. Bureau of Biological Survey on the Migratory Bird Law, of which he is a member.

Meeting in Washington December 11-12 of the Advisory Council of the President's National Conference on Outdoor Recreation, of which he is a member.

Conference in Hartford, Conn., March 4, called by the State of Connecticut. This was a gathering of the officials of the New England States having in charge fish and game interests, for the purpose of bringing about uniformity in the lobster laws in New England. The laws are so different in their general effect that it is impossible to obtain the teamwork and standardizations of practices so essential to building up this valuable industry.

The President's National Conference on Outdoor Recreation in Washington, May 28-29. The Director is a member of the Advisory Board, and a member of the permanent committee on game and fur-bearing animals.

Meetings August 17-22 in Denver, Colo., of the American Fisheries Society, the International Association of Game, Fish and Conservation Commissioners, and the Western Association of Game, Fish and Conservation Commissioners. The chief accomplishment was a full discussion of the Game Refuge — Public Shooting Grounds bill, together with the formulation of plans for again presenting it to Congress. (See "Federal Control of Migratory Birds.")

#### ACKNOWLEDGMENTS

Acknowledgment is made of the splendid helpfulness of various agencies interested in wild life, in undertaking and accomplishing certain projects vital to the welfare of wild life, but for which this year no appropriation was at hand.

Such was the work of the Federation of the Bird Clubs of New England. This association organized a drive on the wild life lovers for the acquirement of suitable areas to be sanctuaries for wild life for all time, and has already turned over to the State Carr Island, Ram Island, Milk Island and 100 acres of forest on Mount Watatic. It was instrumental also in having Egg Rock set apart as a sanctuary. (See "Reservations.") It likewise financed the patrolling of the most important of the tern colonies in breeding season; maintained a special agent on Martha's Vineyard for the extermination of vermin as an additional measure of protection for the heath hen; contributed to the purchase of a furnace for the dwelling at Penikese Island; and conducted (in co-operation with the Massachusetts Society for the Prevention of Cruelty to Animals) a campaign to stop the practice of abandoning cats. It likewise sought to stimulate interest in wild life by providing free lectures on birds, and conducting a field day and bird conference at Babson Park.

Of an equally important nature was the action of the fish and game associations in providing a fund for increasing the rearing facilities at the fish hatcheries and game farms. Plans had been made to enlarge the stations for carrying a good proportion of the stock to larger size, so that the birds could be liberated in the spring as adult stock, and the fish distributed as one and two-year old fish, large enough to be caught when planted. The hunters and fishermen strongly favored this plan. When it became known that no appropriation had been received for construction work, and that consequently this plan would be postponed an entire year, the situation was laid before the clubs, with the suggestion that they finance the work. The response was immediate, and with the funds contributed certain needed extensions were made. After completion of the work (which is still in progress) a full statement will be made in the annual report.

Credit is due likewise to the fish and game associations for their nearly unanimous support of the sporting license bill when it was before the Legislature. In addition to the foregoing, the associations continued to work for the cause of fish and game conservation in so many and varied ways that space does not permit enumerating them.

Acknowledgment is made of the unremitting helpfulness of the Federal Game Warden for this district, the State Constabulary, and the State Police, whose boat and officers have been at our disposal on various occasions.



And once more we repeat our acknowledgment of the unwearying interest and helpfulness of the large number of persons and organizations who in this and other years have worked with us on matters of mutual interest.

### ENFORCEMENT OF LAW

No change was made in the personnel of the law enforcement organization during the year. The regular field force of thirty-one wardens, though not large enough to adequately patrol the State, has maintained a high record of efficiency in coping with violators of the fish and game laws. It is hoped that the time is near at hand when the funds will be available to increase this force to a number commensurate with the task of enforcing the fish and game laws over the length and breadth of the Commonwealth and to keep pace with the ever increasing number of hunters and fishermen.

Although it has been necessary to use some of the wardens to assist on fish and game propagation and distribution from the hatcheries, yet the bulk of this work comes at a time that is usually considered an off-season in law enforcement work, and for that reason it does not interfere materially with the regular patrol work.

Although each city and town has the right to request this Division to appoint a local fish and game warden to be compensated by the town, only 65 cities and towns have taken advantage of this law and requested the appointment of local wardens. In addition to the town warden force, the regular force is supplemented by unpaid deputy wardens numbering about 150, and although some of the men on this volunteer force have worked hard and conscientiously, yet the sum total of the accomplishments of this force was, in the main, rather disappointing.

From this town warden and deputy warden force 12 men were selected and employed as special wardens for a month during the hunting season. As far as possible the men selected were those who had shown particular zeal and initiative in the gratuitous service they rendered in the past to our district wardens.

Three new Ford touring cars were added to the equipment of the law enforcement unit, and one of the 1922 Ford cars in the service was exchanged for a new car. This brings the number of Ford cars in the service up to 22, and 9 more will be required to put the warden force on a thoroughly efficient motorized basis.

The court work for the year was as follows: Number of cases, 697; convicted, 656; discharged, 41; (filed 75, appealed 41); fines imposed, \$9,928; costs paid, \$131.05. Licenses revoked: resident combination, 82; resident hunting and trapping, 46; resident fishing, 70; non-resident combination, 1; non-resident fishing, 4; alien hunting, 2; alien fishing, 9; lobster fisherman's, 1.

A consideration of the cases brought before the courts shows that the violations which are most numerous do not change very much from year to year. Fishing without a license heads the list each year, and this year 182 cases were brought before the courts on this charge. No apparent reason can be discovered why this law is so widely violated. It has been necessary to obtain a fishing license since January 1, 1922, and enough publicity has been given this matter during this period of time to insure all fishermen knowing the requirements of the law.

The alien population is always a source of trouble in the enforcement of the game laws, and during the year 19 aliens were taken before the courts for the unlawful possession of firearms, and in all the cases except one a conviction was obtained and the firearms confiscated. Closely associated with the alien problem are the cases of killing song and insectivorous birds, of which there were 25. Practically all of these violations were committed by foreign-born residents.

One of the most contemptible forms of violation which appears to be always with us is hunting and fishing before the season opens by the so-called "sooner," thereby robbing the law-abiding sportsman of his share of fish or game. An example of this type of violation is the case of two men who were arrested on August 2 after having killed a deer at Sandwich. There can be no doubt of these violations being deliberate and premeditated.

Another form of violation which has been very common during the past few years is that of killing protected shore birds. It is true that of the many species of shore birds only four may be legally killed, and some of the protected birds closely resemble those which may be legally hunted. Nevertheless, it is incumbent upon every person who hunts shore birds to thoroughly school himself in their identification or to refrain from this class of hunting. While these violations are not as wanton as in the case of the "sooner," they are inexcusable no less.

Hunting without a license is in no way an obsolete charge, as 66 cases were prosecuted under this heading. While its disregard in no way compares with the fishing license law violations, they are entirely too numerous. When the sporting license replaces the separate hunting and fishing licenses on January 1, 1926, it is hoped that unlicensed hunters and fishermen will be reduced to a minimum and efforts will be redoubled to accomplish this.

The outstanding serious violation of the year was in the case of two men arrested in northern Worcester county in the act of setting out poison to kill fur-bearing animals. Not only had they unlawfully poisoned many fur-bearing animals, but many domestic animals were killed and endangered. Fines totalling \$375 were assessed against them. This was the full extent of the law as it then stood on the statute books, but as a result of this case the penalty for this offense was increased to a heavy fine and a jail sentence. The apprehension of these men ended a very elusive form of violation which was known to have existed in that locality for some time.

It is encouraging to note that the trapping laws as a whole are very well observed. Gradually, the trapping industry is being placed on a commercial basis as shown by the advent of a separate trapping license next year. As trapping is more of a business than a sport, this appears to be the proper way of handling it, and with the proper observance of the laws the fur industry can be maintained and increased in this State.

Outside of the prosecutions for fishing without a license there were no violations of the inland fisheries laws of a serious nature. The usual run of cases of taking short fish or taking fish out of season were handled, and neither class is excusable. The man who goes fishing without providing himself of the means of measuring his fish knows that he is laying himself open to the commission of violations almost as much as the "cheater" who fishes before the season opens.

In the coastal fisheries, violations of the lobster laws were most prevalent, particularly taking "short" lobsters. 18 cases of this sort were prosecuted during the year involving fines of \$776, and 308 "short lobsters" were seized in the prosecutions. The proper enforcement of the lobster laws continues to be a serious problem. The willingness of the public to buy these illegal lobsters through "bootleg" trading adds to the difficulty. The Division is doing all within its power to maintain and build up the lobster industry in this State, but unless the lobstermen themselves realize that it is being done for their benefit, and co-operate, this policy cannot be successfully carried out, and the ruin of their business and an economic loss to the public will result. To further assist the lobster industry a group of wardens regularly inspects the shipments of lobsters from the Maritime Provinces during the spring and early summer, seizes the illegal lobsters, and liberates them in our waters. This is an important factor in the work, as shown by the fact that 14,828 lobsters were seized and liberated during the year.

Other violations pertaining to our coastal fisheries were the torching of herring in the restricted areas of Boston Harbor and adjoining cities and towns. The most effective drive against these violators occurred at Winthrop on September 2, when ten men were apprehended and arrested, and fines totalling \$500 were imposed by the lower court, from which the defendants appealed.

The taking of smelt during closed season by residents of the North Shore has presented another problem. This year 9 violators were taken on one occasion, and ultimately paid substantial fines. Vigorous action of this type has resulted in a fairly good observance of the smelt law on the South Shore, and the same results are looked for in other sections.



## NEW LEGISLATION

The following laws were enacted during the 1925 session of the Legislature: —

*Chapter 295.* This was the most important law passed during the session, and in effect abolished the present form of separate hunting and fishing licenses and substituted a sporting license to cover both hunting and fishing, and a trapping license to cover trapping. Considerable dissatisfaction having arisen over the amount of the non-resident license fee, this Division is filing a recommendation for further consideration of this point by the Legislature. (See Appendix for recommendations for legislation).

*Chapter 249.* This law vests in the Governor greater authority in the matter of protecting the forest lands during a time of extreme drouth. When this condition obtains, he may close the woodlands to all persons except the owners or their agents, and may suspend the fishing season if such action is deemed necessary to prevent forest fires. Previously the Governor's authority was confined to the suspension of the hunting season. He may also arrange for an extension of the seasons which had been closed, in order to provide just and reasonable facilities for hunting, trapping and fishing. No closed season will be declared on migratory water fowl or shore birds during a forest fire crisis, but such species may be hunted only in the areas remote from the danger zone.

*Chapter 179.* This law closes the season on hares and rabbits on February 15 in all counties except Nantucket. Previously the season had closed on the last day of February. The season on Nantucket remains unchanged.

*Chapter 104.* The season for all trapping now closes on March 1, and muskrats are thereby protected during the time when they are commencing to breed and during the time when they are often driven from their natural habitat by flood conditions, resulting in larger catches being taken.

*Chapter 334.* This law increases the maximum penalty for the placing out of poisons to a fine of five hundred dollars and imprisonment for not more than one year, or both such fine and imprisonment. This was an emergency law, enacted to stop the practice of poisoning fur-bearing animals which had resulted in the death of many domestic animals.

*Chapter 320.* As all public lands are game refuges, the hunting or trapping of any birds or quadrupeds whatever thereon had been prohibited. This law allows the persons in charge to issue permits for hunting or trapping those species known to be destructive to useful game or to agriculture. It also permits the Commissioner of Conservation to declare an open season on deer in certain of the State forests where the deer have been doing damage to the forest nurseries. Such an open season would be declared at the time of the regular open season on deer and under the same regulations.

*Chapter 199.* This increases the bounty on the wild cat and Canada lynx from five to ten dollars to provide a greater incentive to kill them, for these animals are increasing and are particularly destructive to bird and game life.

*Chapter 103.* This law continues for another three-year period the close season on quail in the counties of Essex, Hampden, Hampshire, Middlesex, Norfolk, Worcester and Nantucket.

*Chapter 105.* Under this act a law enacted several years ago whereby the use of live decoys on Nantucket was prohibited has been repealed.

*Chapter 106.* This provides a two-year close season on deer in Essex county.

*Chapter 107.* A close season of two years for hares in Essex county is provided by this law.

*Chapter 259.* This act establishes Egg Rock as a permanent wild life sanctuary, dedicated to the late senior Senator from Massachusetts, Henry Cabot Lodge.

Recommendations for new legislation will be found in the Appendix.

## EDUCATION AND PUBLICITY

No departure was made from the usual method of conducting the publicity work by means of illustrated stereopticon and moving picture lectures covering different



phases of divisional activities. The bulk of this work is done by the Director and the Chief Warden, and the calls for lectures steadily increase. This demand may be attributed to an increasing interest in the out-doors and in wild-life conservation, as further evidenced by the increase in the number of organized fish and game associations and sportsmen's clubs, before which the greater number of these lectures are given.

The usual exhibit of live fish was displayed in the State Building at the Eastern States Exposition in Springfield, but no other exhibits of this nature were put on owing to the lack of funds and of the assistance required for their proper handling.

During the year a system was established for the regular contribution of news items to the newspapers throughout the State and to other publications. These contributions discussed in detail the laws and regulations pertaining to hunting and fishing seasons as they were about to open, and also other activities of the Division. A noticeable degree of co-operation was obtained from the press in this work, as demonstrated by the liberal amount of space devoted to the articles. In a great many instances they were reproduced verbatim. In this connection a monthly list of the persons convicted of violations of the fish and game laws and whose licenses to hunt and fish were revoked for one year was given to the press for publication. Experience has demonstrated that the greater part of the violations are wanton and wilful, and for that reason the time has come when the names of these persons should be made known to the sportsmen and the general public. The effect of public opinion may instil a greater respect for the law in the minds of such persons than penalties seem to do. Beyond this — any person convicted of a violation loses his right to hunt and fish in this State for one year following the date of his conviction. Effective enforcement of this law can only be obtained when police officials and the public are in possession of the names of persons not eligible to hunt or fish.

## BIOLOGICAL DEPARTMENT

The work continued on the lines established in previous years, and consisted mainly of field work and distribution activities.

### FIELD WORK

Examinations were made of ponds where unusual mortality had occurred among the fish, and in addition, specimens of both fish and game from various sources were autopsied and routine pathological examinations made.

Work on the alewife was a continuation of the routine of several years back, consisting of restocking of old breeding grounds now made accessible by the installation of fishways (see "Alewife"); the opening of additional river systems by the installation of fishways (see "Fishways"); biological observations on all alewife streams during the spring run, with special attention given to the return of the young alewives from the spawning beds to the sea.

Detailed information and statistics of the shellfish industries were collected (see "Mollusk Fisheries").

The development of Penikese Island as a wild life sanctuary was in charge of the biological department (for details, see "Reservations").

### DISTRIBUTION

The distribution of the stock produced at the fish hatcheries and game farms comprised the bulk of the year's work, and included not only the stocking of covers and waters, together with proper records of the same, but also the supervision of the stock from time of egg-taking until final distribution, as well as the procuring of new brood stock.

Special consideration, too, was given to the stocking of the State ponds. For instance, the salvaged white perch were all planted in ponds specially selected after study and inspection. The same was true of the bass ponds stocked this year, and the list of suitable waters is available for use next year.

Breeding areas which, according to law, may now be set aside in great ponds, were also investigated in several counties, and in due course action will be taken on them.

#### FISH AND BIRD DISEASE

In addition to routine pathological examinations of diseased fish received at the laboratory from time to time, any abnormal conditions existing among the stock at the hatcheries were studied and treatment applied.

In June a severe epidemic attacked the young pheasants at the Wilbraham Game Farm, detailed under the station report. Although no cure for the sick birds was found, the study given to the subject will be of value in preventing a recurrence of this incident.

A scientific study of the life history of the grouse, covering the entire range of the species in the United States and Canada, is now under way, for which see "Ruffed Grouse." The Division has received specimens from various sources in the State and forwarded them to the investigators for study.

### WILD BIRDS AND ANIMALS

#### WINTER FEEDING

The winter of 1924-25 presented no hardship to the wild life. There were very few sleet and ice storms and less than the usual snowfall. Winter let go early. February and March gave mild, almost springlike weather; and though there was a severe snowstorm the middle of April it was nothing which would affect the wild stock. No emergency existing, very little grain was put out as compared to other years — 2,080 pounds to 342 applicants.

#### BREEDING SEASON

Wild life of all kinds was favored by a breeding period of exceptionally good weather, with an equally favorable growing season following, and the crop of birds and game as observed in the fall was substantial.

#### FIRES

The drouth conditions of the past two years were not repeated. Though there were dry periods in August which aroused some apprehension, the rains and snows of October sufficed to thoroughly wet down the ground and remove any possible fire hazard.

#### POSTED LAND

About the same amount of land has remained posted during the year as that which has existed over a period of years. The organizations of hunters and fishermen have been real factors in reducing the amount of such lands in certain districts. It is to the great credit of the land owners of this State that they have adopted the present democratic attitude toward the fraternity. In return for this splendid attitude it is incumbent on the sportsmen and fishermen to extend their efforts to be a factor in the protection of these open areas.

#### MIGRATORY BIRDS

##### *Song and Insectivorous Birds*

Permits were issued to 81 persons for the collection of birds, eggs and nests for scientific purposes. Sixty reports were made, showing 311 birds and 235 eggs had been taken. There were 283 bird banding permits issued to persons co-operating with the U. S. Biological Survey in their studies in bird migration.

The acquisition of State-owned reservations, to be sanctuaries for wild life for all time, and described elsewhere in this report, will inure to the benefit of the song and insectivorous birds, to whom suitable breeding grounds will thus be insured. For example, the Watatic Mountain sanctuary is the last remaining breeding ground in eastern Massachusetts of the pileated woodpecker.



*Migratory Game Birds*

*Shore Birds.* — There was a noticeable increase this year on both migrations in the numbers of the smaller species. It is safe to say that under the Federal regulation all of these smaller species are now given, both in Canada and the United States, a degree of protection that has amounted almost to an absolute immunity from the gunner. Nevertheless, the birds have not come back as rapidly and in such numbers as was reasonable to expect. In this respect the same interesting questions arise as in the case with our song and insectivorous birds. It is obvious that the shore birds are the victims of certain destructive forces separate and apart from the hunters, as is true of the song and insectivorous birds. With the complete protection accorded the latter there would be an enormous annual increase if the destruction by man were the principal factor. Taken collectively a slight increase in the shore birds is noted, particularly in the smaller species and in the curlews.

*Plover.* — The spring flight was of the usual proportions and somewhat later than usual. There was an unusually heavy fall flight, the birds coming along well toward the early part of the season, then a lull, with a heavier flight later on.

The upland plover appears to be gradually extending its range in this State.

More killdeer plover were reported this year than usual.

The piping plover is just about holding its own.

*Snipe.* — The spring migration was normal. The fall migration each year depends a great deal on the suitableness of the grounds. This year, in common with several years past, the meadows were not in attractive condition in the early part of the flight; but the rains in the later part of the season helped materially, so that more birds than usual stopped during the late migration.

*Woodcock.* — The spring migration was of the usual proportions. The fall migration included one of the heaviest flights that has been known in this State for many years. It was of short duration, and probably the result of severe weather conditions that hastened the birds along. It is difficult to say whether the presence of more than usual numbers was due to an increase in the number of birds, or because they piled in steadily over a short period of time on account of the freezing weather and snows in the midst of the migrating season.

*Rail.* — There was nothing unusual in either the spring or the fall migration.

*Sandpipers.* — The smaller species were present in somewhat increased numbers, both on the spring and fall flights.

*Winter and Summer Yellow Legs.* — There was one of the heaviest flights of these birds that has occurred for some years, and they moved northward in larger numbers and later in the season than usual. The fall migration started well and continued rather late, with certain periods of scarcity, offset by other times when the birds were quite plentiful.

*Curlew.* — More curlew are being reported each year, with the indication that these birds are slowly but steadily on the increase.

*Ducks.* — The wood duck is gradually coming back. So substantial an increase has been reported in certain parts of the United States, particularly in the Mississippi River valley, that it is reasonable to expect this increase will become more and more apparent in the New England States.

The usual scattering of mallard ducks has been noted throughout the year.

The spring flight of red heads was a little larger than usual. The red head stops very largely in the region in and about Martha's Vineyard. Owing to the change in some of the ponds that were former breeding grounds, through the salting down of the water by the heavy storms of a year ago, there is less attraction in this region for the red head than previously. This undoubtedly accounts for the smaller number of birds that stopped as compared to other seasons.

The blue bill and the red head frequent practically the same areas in our State, and the foregoing comments on the red head apply equally to the blue bill.

Black ducks are more than holding their own. With the introduction of the wild life sanctuary and the building up of breeding grounds in many parts of the



State, which today have no such areas, the black duck can be satisfactorily increased in all parts of the State.

The usual scattering of canvasbacks was noted on the fall migration.

*Geese.* — From December 1, 1924, on, the remarkably mild season had its effect on the fall migration of geese. In the latter part of the season the flight was unusually heavy, due no doubt to a quick change in temperatures toward the latter part of the migrating season. The spring flight was unusually heavy in some regions. Taken as a whole, more were noted than in an ordinary season. The fall flight started earlier and with a more constant flight than usual, no doubt the result of the snappy weather that prevailed about the middle of the migration period.

The spring flight of brant was of ordinary proportions. The southern migration started a little earlier than usual, with more than a normal number of birds appearing toward the latter part of November.

*Statistics of the Gunning Stands.* — Number of stands operated, 68; geese shot, 3,976; ducks shot, 8,408; live goose decoys used, 3,193; wooden goose decoys used, 2,724; live duck decoys used, 3,288; wooden duck decoys used, 2,010.

### *Migratory non-game Birds — Gulls and Terns*

The amount of appropriation for the protection of wild life in the field makes it impossible for this Division to devote much money to the care of the gull and tern colonies. The Federation of the Bird Clubs of New England volunteered to finance the work during this season, and wardens (vested with State authority) were placed at Chatham, Nantucket, Orleans, Wellfleet, Muskeget and Sandwich and paid by the Federation. These locations were posted with State signs, calling attention to the laws protecting breeding areas.

The fundamental need in the protection of the gulls and terns is to insure to them the undisturbed use of their breeding grounds, which, through the building up of the coast into summer colonies, are becoming more and more restricted each year. State ownership of these breeding areas is the only remedy — hence it has been our purpose to acquire as many as possible of the natural locations. In this objective the Federation of the Bird Clubs of New England is actively interesting itself. Penikese Island, coming through act of the Legislature, was set apart as a wild life sanctuary under the jurisdiction of this Division (as set forth in last year's report), and by similar action this year Egg Rock became a reservation. The Federation of the Bird Clubs of New England has acquired and turned over to the Commonwealth, to be wild life sanctuaries, Ram Island, Carr Island, and Milk Island, and several other locations are in prospect. (For details, see "Reservations.")

### *Federal Control of Migratory Birds*

As recorded in the last report, the Game Refuge — Public Shooting Grounds Bill was introduced into the Sixty-eighth Congress as H. R. 745 and Senate 2,754. Much work was done by this Division to bring about the passage of the bill. Near the close of the session it passed the House, but failed of enactment in the Senate merely because it could not be reached in the press of business in the closing hours.

In the course of the session considerable opposition to the Federal hunting license feature of the bill had grown up in the South and West. When the usual annual gathering took place in Denver in August of the officials connected with game, fish and conservation matters, this was one of the principal matters under consideration. A committee of five was appointed, representing the American Game Protective Association, the Izaak Walton League of America, the Western Association of State Game Commissioners, the National Association of Audubon Societies, and the International Association of Game, Fish and Conservation Commissioners — on which committee the Director of this Division was appointed. Its purpose was to draft and submit to Congress a bill which would unite the sentiment of the North, East, South and West on the measure, and at the close of this report the preparation of this bill is in progress.

UPLAND GAME  
*The Hunting Season*

The hunting season was one of the most favorable that has been enjoyed by the sportsmen of this State in many years. There was sufficient rain to prevent the necessity of closing the season on account of drouth, and at the same time not enough to spoil many days in the open. The unusually snappy weather occurring in the middle part of the season was one of the factors in helping along the woodcock flight, so that our sportsmen had better shooting than has been the case for many years. Taking all species of upland game together — there was more of it in the covers, and the hunting was under more favorable conditions, than has been the case for many years.

*Pheasants.* — The covers contained unusual numbers of pheasants at the opening of the breeding season, due partly perhaps to the reduced kill in the very brief open season of 1924, and the numbers were swelled by the hatchery-reared birds wintered by the clubs and liberated in the spring as adult stock. The weather in the breeding season being mild, dry and with little rain, exceptionally large numbers of young were raised.

The plan of liberating as many pheasants as possible in the spring as adults has been tested sufficiently to demonstrate its value. Because shooting has been confined to the cock birds, efforts in the future will be directed toward putting out an increasing number of mature cock pheasants each spring. The pheasant is coming more and more into favor as a game bird, with a corresponding lightening of the strain on the native species.

The total number of pheasants reported shot in open season was 2,821, divided according to counties as follows: Barnstable, 16; Berkshire, 92; Bristol, 184; Essex, 420; Franklin, 79; Hampden, 242; Hampshire, 258; Middlesex, 500; Norfolk, 287; Plymouth, 266; Suffolk, 4; Worcester, 470; locality not reported, 3.

*Ruffed Grouse.* — With all circumstances in their favor — a curtailed open season in 1924, an open winter with mild weather and no deep snows, added to the scarcity of natural enemies (notably goshawks) the ruffed grouse wintered in excellent shape and good numbers.

Weather conditions were exceptionally good both during the breeding season and in the growing period following. Though in the eastern part of the State there seemed to be no specially noteworthy production of young, in the central and eastern sections good-sized broods were reported through the summer, and the predictions were for a good season in the fall.

For most parts of the State it was true that the grouse season opened under favorable conditions. The weather was clear and cool, the woods fairly moist, and the leaves partly off the trees. Grouse were reported plentiful in some places and very scarce in others, and the conditions of last year seemed to prevail, namely, that the birds were very wild and found in unusual places the first of the season, while at the same time missing from their common resorts. As the season went on they showed up in better numbers.

Looking back over a period of years it is interesting to note that nearly every fall the same comment goes round, that grouse are very scarce at the opening of the season; that they appear to be scattered into all kinds of unusual places; and that probably they will show up in better numbers towards the end of the season. These are the stock expressions passed around by the hunters. As a matter of fact, it is a perfectly logical situation. At first the weather is mild, there is still an abundance of feed, the birds are scattered, and it is only when colder weather comes and the food supply shortens up that the birds begin to collect in the most favorable areas. Likewise it is inevitable that certain localities will contain more birds than others. This accounts for the "spotty" conditions that are often referred to. It is likewise logical that in some regions where sufficient heavy timber remains, together with favorable breeding and feeding grounds, the birds will be present in greater numbers year in and year out, than is the case in localities where, because of changes due to deforestation and the more rapid building up, the birds are compelled to seek new



grounds or have a less attractive location than formerly existed. Taken as a whole, the supply of grouse this fall was very satisfactory, and the indications are that more than the usual number are left for next breeding season.

A special study of the ruffed grouse is under way in New England. The life history, particularly the cause of the periodic shortage, will be closely studied, and will form a part of the general investigation embracing the entire range of the grouse in the United States and Canada which is being conducted by a National Ruffed Grouse Committee appointed by the American Game Protective Association of New York. The field is so large, a sub-committee was formed in October, 1925, with Dr. John C. Phillips as chairman. Dr. Alfred O. Gross of Bowdoin College, Brunswick, Me., is directing the work in New England, and Dr. E. E. Tyzzer of the Harvard Medical School has volunteered to do the specialized work concerned with diseases. Dr. Arthur A. Allen of Cornell University is directing the work in New York and in other States included in the range of the grouse outside of New England. Not less than 15 diseases or parasites, largely of the alimentary tract, have been found. It is yet too early to give a fair estimate of the relative importance of these diseases, but it is hoped that the work of the next three years will yield definite results and conclusions. In this, one of the most extensive and intensive researches of this kind ever undertaken, the co-operation and assistance of persons and organizations has been asked, particularly in supplying specimens. Thus far over 700 grouse have been received by the investigators. All specimens from Massachusetts and New England should be sent to Dr. Alfred O. Gross, Bowdoin College, Brunswick, Me.

*Quail.* — On the quail range winter conditions were favorable to the quail — no deep snows or extreme cold, and no necessity for artificial feeding. More brood stock was seen at the opening of the breeding season than has been the case for several years, and there was a large production.

There were more quail in what we might call the natural quail country of the State at the opening of the shooting season this fall than has been the case for many years. We hope that our efforts to restock Essex county will bear fruit one of these days, but up to this time but few coveys of birds have been reported. In those counties where they have been systematically gunned year in and year out the birds have come back strong. From this we do not mean to argue that shooting up of the stock is the prime requisite in producing an annual increase; but it is an interesting fact that the birds do not seem to be prospering in the counties where the season has remained closed. It is merely an interesting example of the complications present in wild life administration. On the other hand, on the island of Martha's Vineyard where the birds have been systematically protected for a period of years, together with a limited amount of annual stocking, the birds have increased in such numbers that an open season this fall was warranted. A succession of two or three mild winters should put the quail supply in a most satisfactory condition — at least in a portion of the State, and might permit of the trapping up of a limited number of quail for distribution in those sections, suitable for the birds, where they have not prospered.

*Deer.* — The season on deer coming within the period of this report (December 1-6, 1924) was a remarkably successful one, weather conditions ideal with cold, crisp weather and plenty of snow. There were 2,012 deer shot (1,064 bucks and 948 does) divided by counties as follows: Barnstable, 145; Berkshire, 402; Bristol, 41; Essex, 19; Franklin, 404; Hampden, 253; Hampshire, 240; Middlesex, 24; Norfolk, 6; Plymouth, 121; Worcester, 356; locality not reported, 1. This is the largest number of deer ever shot in any open season, previous records being 1,587 in 1913 and 1,581 in 1922.

The usual number of young were seen in the summer of 1925, and in spite of the large number killed in the open season in December, 1924, deer were apparently as numerous as usual at the approach of the 1925 open season in what are considered the deer counties. In other parts of the State, where the stock is smaller and the environment not specially suitable, they have thinned out, and in the eastern part of the State very destructive toll is taken by automobiles, trains and



dogs. On the matter of damage to crops, the tendency at the present time among the farmers seems to be to collect money damages, rather than to take advantage of their privilege under the law of shooting the deer. Deer shot while damaging crops numbered 83; and towns were reimbursed by the Commonwealth for claims paid for damage by deer to the amount of \$5,997.20, with unpaid claims still on hand awaiting further appropriations.

*Squirrels.* — Taking the State as a whole, the gray squirrel seems to be on the increase. These animals will travel to locate an adequate food supply, with the result that there may be a scarcity in a given locality in a given year, with a fairly abundant supply the following year if food conditions are favorable. A great deal depends on whether the nesting conditions have been preserved or wiped out through deforestation.

*Hares and Rabbits.* — The breeding season was favorable throughout the entire State, with the result that nearly a normal supply of both cottontails and white hares obtains. Both species can come back very quickly if free of devastation by disease or vermin. While the hunters undoubtedly clean them up pretty closely in certain localities, yet there are vast areas in which practically no hunting is done, which serve as reservoirs from which the depleted areas can quickly be refilled if the breeding and living conditions are favorable.

*Fur-bearing Animals.* — The beneficial effect of the closed seasons which have been in force for several years is noticeable in some species. The style in furs is always a factor. For example, in a given year the muskrat will be most in demand, and in another year this may shift to some other species. At present there is little market demand for skunk skins, and with the lessening price and demand goes a less intensive pursuit of the animal. The same to a less extent is true of the muskrat. Likewise the price of furs determines in a substantial way the intensity of the annual trapping campaign. At the beginning of the present trapping season the prices of the more common furs are low as compared to those of the last few years.

The indications are that there is a substantial stock of fur-bearers. There will always exist the problem of adjusting the operations of the trapper to those of the hunters and the land owners. We are annually beset with complaints of sporting dogs being taken in traps, and in some instances other domestic animals. There are also complaints of carelessness in the placing of traps. Some go so far as to contend that the trapper should be put out of business, and that no traps should be permitted to be set. There are very few species of fur-bearers that do not at some time or other in the year take their toll of other species of desirable wild life. The systematic trapping of them is not only desirable on account of the value of the annual catch, but likewise in assisting in the preservation of the balance of nature.

The reports by trappers of their catch in 1925 show: number of reports, 447; muskrat, 5,017; mink, 655; skunk, 3,923; fox, 1,481; raccoon, 389; squirrel, 17; weasel, 197; otter, 21; total, 11,700.

#### ENEMIES TO GAME

Year by year we repeat the statement that the wild hunting house cat is one of the greatest enemies to wild life existing today, and we await the time when this truth shall have taken root in the public consciousness. Only then can remedial measures be secured. To help bring this day nearer, the Federation of the Bird Clubs of New England co-operated with the Massachusetts Society for the Prevention of Cruelty to Animals and the Massachusetts Fish and Game Protective Association in an attempt to stop the abandonment of cats by thoughtless citizens. Twenty-five hundred posters were placed at central points, and over 5,000 letters distributed citing the law and urging people not to abandon their cats at the close of vacation time.

On all sides may be seen evidence of the necessity of reducing to a harmless minimum certain enemies to desirable wild life, particularly such species as the great horned owl, the weasel, the red squirrel and the wild hunting house cat. In

the same list could be placed other species that are more or less on the border line, but concerning the above there is no question. The extent of the depredations by the wild hunting house cat has been stressed so often that it appears to be a cold repetition, but careful observation shows the destruction from this cause to be enormous. We appreciate the practical difficulty of the rural land owner in trying to keep under control the house cat upon which he relies to keep down the vermin around his homestead; but serious efforts are being made by many land owners to work it out. If all cats could be closely restrained during the breeding season for birds and game, an immediate and substantial increase in the desirable species would follow. The land owner is entitled to protection for his cat that is retained for the destruction of vermin; but the cat which has passed out of ownership and ravages the covers should be systematically destroyed. This cannot be too strongly impressed on the rank and file of our people. We are following the illogical course of expending large sums each year to protect and increase our desirable wild life, while at the same time doing comparatively little to eliminate this great factor in its destruction.

Bounties of \$5 each were paid on 78 wild cats (Canada lynx or loupcevrier) under Section 90, Chapter 131, General Laws.

#### RESERVATIONS

##### *Martha's Vineyard Reservation*

During the early part of the year, beginning with December, 1924, watch was kept both on and off the reservation for violators of the law pertaining to the heath hen. Traps were set and maintained for cats, hawks and rats, and this vermin pursued with firearms as well. The work in January was a repetition of that of December, except that food was put out for both heath hens and quail. During that month 17 heath hens were feeding near the fire tower every day, and 8 more at the farm of James Green at West Tisbury. At other places on the island single birds and two's were found, making the total of all the known birds 31. In February, March and April conditions and routine work continued as described. The winter throughout was mild.

April 18-20 the State Ornithologist visited the reservation to take the annual census, but without much success because of unfavorable conditions. He himself saw 2 heath hens, neither of them on the reservation though within a mile of it, and the superintendent saw one which was on or near the reservation.

In the spring about 4 acres were ploughed to be seeded to clover, and later, a part of it to buckwheat. Corn was placed at the blinds for the study of the heath hens at close quarters and a new blind was constructed. In March, for no apparent reason, the heath hens had dwindled away from the feeding places and but few could be found anywhere. A report of 5 birds feeding near Duart's Pond could not be verified, but there is no reason to doubt it. Four were seen by the Superintendent in April at the farm of James Green.

The weather during the breeding time of the heath hen was favorable in every way. Three broods of chicks were seen during June, one in the meadow half way between the reservation house and the fire observation tower (6 chicks at least), and the other two broods between Pohogonot and the main road between Edgartown and West Tisbury. About that time there were heavy rains, and over two inches of rain fell in three days. It is probable that the rains destroyed these broods, for no young birds were reported thereafter.

Late in March Professor Gross visited the reservation to continue his studies of the heath hen, and a little later made his report to those who had financed his work, several of whom are members of the Federation of the Bird Clubs of New England of which Professor Gross is Vice-President. His report indicated that the heath hen were fewer in numbers than at any time in their history. The situation seemed to call for immediate action and the best judgment of the most able ornithologists; so at the suggestion of and in co-operation with this Division, the Federation of the Bird Clubs of New England called a conference to consider to what extent outside



assistance could be given to help meet what appeared to be a crisis in the history of this colony.

The conference was held on June 4, with an attendance of between 45 and 50 persons. Professor Gross read his report, including specific recommendations, and after a thorough discussion the conference voted as follows:

1. That the work of providing food for the heath hen be continued and the birds baited to and kept on the reservation as much as possible for closer care and protection.

2. That one additional warden with State authority be sent to the reservation and stationed there from October 1 to March 1, with instructions to make a complete patrol of the entire reservation and vicinity each day; and that this patrol be rigidly enforced. The salary of this warden and expenses to be paid from funds raised for this purpose.

3. That James Green of West Tisbury be made a warden.

4. That it be the sense of the meeting that Commissioner Bazeley be requested to retain the area formerly known as the Cromwell tract as an addition to this heath hen reservation and prohibit all shooting on it, when the area is finally acquired by the Commonwealth.

5. That an emergency fund of \$1,000 be raised by the Federation of the Bird Clubs of New England to aid in the work of protection and the money raised to be disbursed by the Federation. In addition to the original plan of trying to raise \$1,000 for a warden to serve through the winter, that an effort be made to raise \$1,000 for vermin control immediately.

Steps were taken by this Division to put into operation recommendations 1 and 4, and by agreement with the officers of the Federation paid James Green a sum of money in consideration of care of the heath hen. The Federation immediately arranged for the Chief of Vermin Control in Pennsylvania to visit the island for a week to study the situation so that the best advice and suggestions would be available. They likewise engaged Edward L. McLeod to take up at once the work of destroying vermin and patrolling against violations. From this time on both the Superintendent and Mr. McLeod pursued an intensive trapping campaign.

The stomach contents of the vermin taken both by Mr. McLeod and the Superintendent have been examined, some of them by the trappers and some by the Marine Biological Laboratory at Woods Hole, but none have shown a trace of birds. This is true also of the hawk stomachs, with one exception, when the two feet of a "small thrush-like bird" were found. The others contained mice, swill or scraps from houses, and the baits used. This, together with the fact that quail have increased (in spite of hawks and cats) to large numbers during the same period in which the heath hens have diminished so rapidly, would seem to indicate that the decrease in the heath hen may not be attributable to vermin, of which there has been no increase during this period.

There is, however, some reason to believe that the sudden decrease in the heath hen may be due to disease. Going back to three summers ago, when the heath hens apparently diminished suddenly (this fact could not be ascertained until fall or winter as during the summer they are hard to see even when fairly numerous), Mr. Frank Goulart found a sick heath hen on the road about two miles from the reservation, and late that same summer the Superintendent found 2 others, one decomposed and the other in good condition, one within 2 feet of the side door of the reservation house. Another was picked up by Harry Athern in West Tisbury and given to the Superintendent. At the time no particular significance was attached to these incidents, but in the light of subsequent events it points to the possibility that these deaths might have been caused by an epidemic, as the fact remains that the disappearance of heath hens was not gradual, but that a vast difference in numbers was noticeable as soon as winter came and the birds were more easily seen in cornfields and other feeding grounds. In the first years of the Superintendent's care the birds increased; he is positive that gunners did not cause the sudden drop, and there has been no abnormal increase of vermin, and no fires,



leaving the logical cause to be some form of sickness. The extent of the decrease is shown by the fact that, while in pursuit of hawks and on the lookout for heath hens, the Superintendent has driven nearly every day this year over the districts inhabited and formerly inhabited by heath hens, and has not seen over four on any one day.

During the period of this report the Superintendent killed 30 cats, 12 crows, 23 hawks and 119 rats of which record was kept, and many others killed by trap, gun and poison, the record of which is lost. Where poison (gas) was used it was impossible to know how many were killed underground. Hawks (mostly marsh hawks) were numerous for a short time in May, but moved on and but very few were seen during the summer on the reservation.

The report of vermin killed by the special warden hired by the Federation is: — 54 cats; 13 hawks; 26 crows; 4 owls; 20 rats.

During the year there were no fires on any part of the island inhabited by the heath hen.

Talks on the heath hen were given by the Superintendent to four groups of members of the Y. W. C. A. on the island. About 100 visitors came to the reservation to see or learn about the heath hen.

Towards the close of the year (November 10) Mr. McLeod saw on the farm of James Green 12 heath hens in one flock.

Attempts to forecast the future of this colony are futile, but no effort is being spared to save it from the threatened extinction.

#### *Myles Standish State Forest*

Dating from April 1 the Division of Forestry took over the entire cost of maintaining the Myles Standish State Forest. Previously the Fish and Game Division had shared the cost of the Superintendent's salary. When reduced appropriation made necessary the discontinuance of some lines of work, the above arrangement seemed logical inasmuch as this land has been developed as a State Forest and not as a game-producing area.

#### *Penikese Island Sanctuary*

A good start was made in the development of Penikese Island. Part of the program called for the reduction of the island to practically its natural state, and early in April the Commission on Administration and Finance contracted for the disposal of the equipment and demolishment of the buildings. The contractor's work was most unsatisfactory. Work was delayed until mid-August; the men stopped work entirely on failing to receive pay; and the island was left in a wretched condition, with much debris strewn about. Plans are under way for completion of the job. The one-story building (formerly the laboratory) is being equipped as living quarters for the caretaker.

The island is to be used as a natural producing plant for rabbits and quail, the surplus to be transferred to other localities. It is believed this can be done without detriment to the tern colonies. To this end 8 white hares and 79 cottontail rabbits were liberated in March. They bred well, and in early fall the number was estimated at upwards of 200, but no distributions will be made until at least February of 1927, by which time they should have become well established.

The 59 quail which were liberated on the island did not do particularly well, the tern colonies having pre-empted the island from May 1 to the middle of August, driving them from the little available cover. This failure of the quail to reproduce may be due partly to the fact that through a mistake of the shipper Mexican quail were sent.

Scratch feed was sent down for the quail, and the fertile land back of the house is to be developed for growing quail and rabbit food. Shrubbery was planted both to improve the general appearance of the island and to provide cover and food for birds.

It is believed that this island can be made a resting place for geese and ducks on their migrations by tethering out decoys on the high points of land, and providing

fresh water and food for any wild ducks and geese which may alight. With this in view sago pond weed and widgeon grass were planted in two small ponds on the peninsula, and in one on the south corner of the island. Ten mated Canada geese and 8 call ducks were shipped to the island.

A day-by-day record is kept of the birds which visit the island. Pole traps have been furnished the caretaker for catching hawks and other vermin. A general clean-up has been made of all lobster pots and gear which were formerly stored along the shore.

#### *Henry Cabot Lodge Bird Sanctuary (Egg Rock)*

By an act of the General Court of 1925 (chapter 259) Egg Rock island was established as a refuge and sanctuary for wild birds, to be known as the Henry Cabot Lodge Bird Sanctuary, and placed under the control of this Division.

Egg Rock lies about one-half mile off the Nahant shore. It is oval in shape, of compact felspar, and, viewed from the north, is like a "couchant lion guarding our shores." It contains about 3 acres, and is some 40 rods long, 12 rods wide and 86 feet high at the highest point.

Old records tell that the gulls laid eggs in abundance there, hence the name "Egg Rock." Large deposits of bird fertilizer are said to have been taken in olden times from the pits of this rock. The seaward side is a great cliff where the birds formerly nested. There is a deep chasm on both of the lengthwise sides, which will afford retreats for the birds except when the surf runs specially high.

Written reports on this rock are very few. In a book entitled "Lin — Jewels of the Third Plantation," 1637, Obadiah Turner writes — "Abel Bullard visited Egg Rock alone, caught many fish and found a large number of bird eggs. Camped in a small grove at the summit." Later one Thomas Dexter cleared off the trees and carried out loam to make a plantation for the growing of cane for chair making. At the present time there is about a half-acre of garden land on the west slope, which might be reforested to attract migratory birds.

The island was ceded to the United States in 1856 by the Massachusetts Legislature for lighthouse purposes. The light first shone September 15, 1857, originally probably a white light, since a reference mentions it being changed later to red. A letter from the Secretary of Commerce dated August 23, 1923 to the Governor of Massachusetts certifies that Egg Rock is no longer needed for lighthouse purposes; and a letter from His Excellency to the Commissioner of Waterways and Public Lands suggested the disposition which has been made of it. The Federation of the Bird Clubs of New England interested itself in the matter, and with the assistance of the Lynn Bird Club secured the passage of the bill.

The light has been partly demolished, and there are four old buildings, — which eventually will be cleared away to bring the rock back to its original natural state for the use of the wild life.

#### *Isaac Sprague Bird Sanctuary (Carr Island)*

The State has a valuable addition to its reservations in Carr Island, a gift of the Federation of the Bird Clubs of New England as a "wild life sanctuary for all time." It was purchased from Isaac Sprague of Wellesley Hills, who in disposing of it to the Federation made a liberal contribution to the project. It is to be a memorial to his father, Isaac Sprague the naturalist, and to be known as the Isaac Sprague Bird Sanctuary. Carr Island is of historic interest, for it was one of the landing places of the ferry between Newburyport and Salisbury as early as 1640, when the freemen of Salisbury granted George Carr (who was regularly appointed ferryman) "the island where he now dwells, — it being the greatest island within the town bounds in the Merrimack."

Carr Island is located in the Merrimack River, between Salisbury and Newburyport. It contains approximately 110 acres of rocky ledge, with salt marshes in the easterly end. There is a depression of about 4 acres on the northerly side, in which there is a never-failing swamp, making a cat-tail marsh. There are several acres of tillable land, now grown up to grass; a number of fruit and ornamental trees in



the vicinity of the houses; a grove of pin oaks and another of pines; numerous old and dying oaks; and the island is dotted over with field cedars. This island is suitable for the song and insectivorous varieties of birds, pheasants, and the swamp area when dammed should invite ducks.

On the island there are several buildings, — a dwelling house, to be retained as headquarters for the members of the Federation, a large barn and a vehicle shed. The two latter, following the policy of restoring these sanctuaries to their natural state, will be removed. The buildings in themselves are an item of value, for the lumber can be used in construction at the hatcheries and game farms. The work of salvaging this lumber was commenced this summer by our wardens, and will be continued in slack periods.

Considerable development work is planned, such as restoring the dam and forming a fresh-water pond to attract wild fowl on the spring and fall migrations; but this work will have to await appropriations.

### *Ram Island Sanctuary*

Through the Federation of the Bird Clubs of New England the State became owner of Ram Island as a sanctuary for wild birds.

This island lies from 150 to 200 rods southeast from the southwest point of Mattapoisett beach, and is a natural breeding ground for terns. It comprises about 2 acres of sand and gravel, together with a small swamp and a few bushes, resorted to by black birds. The swamp contains a half-acre pond into which, in winter storms, the salt water washes. With a small amount of work this can be protected and kept fresh and its size increased three-fold, making it attractive to ducks in the fall.

### *Mount Watatic Sanctuary*

Near the close of the year the Federation of the Bird Clubs of New England turned over to the State, to be a sanctuary for wild life, a hundred-acre tract of wild land on Mount Watatic in Ashby. Eighty-five acres are covered with the finest red spruce to be found in eastern Massachusetts, and the remainder is old pasture land, growing up to spruce and pine. This is the last remaining home in the State of the pileated woodpecker, and is the southern limit of the breeding range of the golden crowned kinglet and Canadian zone warblers.

### *Knight Bird Refuge (Milk Island)*

A very valuable acquisition is Milk Island, off Rockport, presented to the Federation of the Bird Clubs of New England by Mrs. Roger Babson, and by the Federation in turn to the State. It is to be known as the Knight Bird Refuge in memory of Mrs. Babson's father and mother.

This island is about 15 acres in area, with a small fresh pond in the center. There is a duck-shooting blind and a small camp. The shores are water-washed boulders and gravel, with some sand on the westerly shore. To the eastward are ledges and boulders. Beach grass is the only vegetation. This island is an exceedingly important nesting place of the common and roseate terns, and will now become a permanent sanctuary for them, as well as a resting place for all migrating birds.

### *Reservations under Sections 69-75, Chap. 131, G. L.*

The Hubbardston Reservation, petition for renewal of which was received in the last fiscal year, was completed for another period of five years from December 15, 1924.

The Lynnfield-Peabody Reservation was re-established for another five-year term from May 25, 1925.

The Millis Reservation was renewed for five years from October 29, 1925.

Petition was received for the establishment of a reservation in Scituate and Cohasset, now under consideration.



## INLAND FISHERIES

### GENERAL

We continue to stress the statements made in previous reports that the stock of fish in our inland waters is not keeping up with the demand. Massachusetts is a small state with a very large population. Practically all of the ponds are easily accessible by automobile, and the shores are being rapidly built up, year by year, with camps that take the people to those waters in all seasons. These ponds may be fished for one species or another practically throughout the entire year, and the stock can not stand the strain. For many years we have advocated some restrictions on the taking of fish through the year. If the stock is to be kept up, it will be necessary that all our ponds be closed to all fishing for at least a substantial portion of the year. This should include the period of ice fishing and the earliest breeding season, with a further restriction on certain fish such as the small-mouth bass during its breeding season. In other words, if the supply is to be kept up, all fishing in the great ponds should be prohibited from December 1 to Memorial Day, and with further closed seasons on later breeding fish such as the horned pout and the small-mouth black bass. It will be much more satisfactory to the fishermen, in the long run, to have a shorter period with more fish to be taken, than the present long open season with a gradually dwindling supply.

### TROUT

For the eastern and central parts of the State the brook trout fishing season was very disappointing. The fishing was poor, and not many good catches were made. The drouth of the fall of 1924 was very destructive to young fish, and again from the middle of May, 1925, the water in the brooks was low. These two dry periods resulted in the loss of many fish, and poor production.

Further west the results were better, as might be expected. The large streams turned out some fine specimens, but in many cases the smaller streams failed to give up the trout they have in years past, for during the extremely dry weather of the fall of 1924 a great many fish died or were destroyed by birds or mink. In Berkshire County the season was not up to expectations. In the early weeks the water remained too high for good fishing and the air was cold; and after hot weather set in a long dry spell had lowered the brooks and dried up the smaller streams. There were some favored sections where very satisfactory catches were made. It is the same with fishing as with the hunting of upland game — the conditions are bound to be "spotty" by reason of the great differences in the physical conditions of the waters.

In some of the rivers of western Massachusetts rainbow trout are beginning to give a good account of themselves. They are showing an increase in the East Branch of the Westfield River, and several were caught at Chesterfield. The Deerfield River yielded some excellent catches, and several weighed as high as three pounds.

### CHINOOK SALMON

While several representative ponds were stocked with Chinook salmon, about the only one that showed results was Peters Pond. Here apparently the salmon find conditions reasonably favorable, and as a result of the annual stocking a fair number of fish running up to two pounds have been taken.

### PIKE PERCH

This species is found in several ponds, but in none can it be said to be abundant. Its one stronghold is the section of the Connecticut River between Greenfield and Turners Falls. For a number of years pike perch were taken during the breeding season, but finally a law was enacted giving it protection. However, as is usually the case, before this protection was given the stock was so greatly reduced that it is coming back very slowly. The indications are, however, that eventually a sizeable fishery will be built up in at least a portion of the river.

### WINTER FISHING AND PICKEREL

In the northeastern section of the State ice formed early (about December 20) and good fishing continued until February 22, making a long and productive season. With local exceptions the season was one of the best in recent years, though the pickerel ran small. It was noticeable that the same individuals were found fishing day after day with success.

For the rest of the State the season ended earlier. Fishing was very good on the first ice, but averaged poor the rest of the season. In many localities after the early good fishing had fallen off the fishermen did not turn out in numbers. Elsewhere the reverse was true — and a check-up of one pond showed 7 pickerel among the 56 fishermen. On the whole, the pickerel ran small and not nearly as numerous as in previous years. In Berkshire County the first of the season was good, but on the whole very few pickerel were taken owing to the thickness of the ice, the depth of snow, and zero weather. Those taken were of good size.

On the Cape the fishing season lasted only a few days.

Our wardens continued the examination of pickerel taken through the ice, with similar findings as in past years, viz., the females much in excess of males, and full of spawn in all stages of development. Four pickerel taken from Big Pond, Otis, on February 1 weighed close to 11½ pounds. Three were females, of which the largest weighed 4¼ pounds. The spawn from this specimen (in the undeveloped stage) weighed 7½ ounces, and fully developed would probably have weighed nearly a pound. It was estimated that in taking this one fish from 80,000 to 100,000 eggs were destroyed. The other two females weighed over 2 pounds each and contained from 35,000 to 40,000 eggs.

We can only renew our representations of previous years—that unless winter fishing is eliminated or greatly reduced, the present demands on the ponds for a reasonable amount of fishing each year cannot be met.

### BASS

The bass fishing season was more satisfactory than usual. Efforts are being directed toward a stricter classification of the bass ponds, and the stocking of only suitable waters. There are certain ponds which are primarily bass ponds, or, at any rate, contain an unusually large number of bass. The effort will be made to preserve the bass fishing in these ponds, without extending the distribution to others where bass are today not present, or are present in small numbers.

### WHITE PERCH

While we have not been able to establish this deservedly popular food fish in the ponds as completely as it is our desire to do (for the field is enormous and our means almost negligible considering the size of the task) there are in nearly every district several ponds which yield good catches of white perch. (See Fish and Game Distribution).

### SMELT

There are several breeding grounds for smelt along our shores that today remain undeveloped, which should be made an important factor in the annual supply. Fishing for smelt is a very popular sport, carried on under very pleasant conditions. When the fish are biting well it is exciting, and productive of a splendid supply of food. The catch for the year has hardly been up to normal, but with increasing attention to the condition of the breeding grounds this fishery could be built up to very substantial proportions.

### HORNED POUT AND CATFISH

The horned pout continues to be one of the most popular fish. It has been demonstrated that by pond cultural methods large quantities can be produced. Given a reasonable protection, such as is afforded by the present close season in the spawning period, and the catch limit, the annual supply can be kept fairly



abundant. The problem is to preserve an adequate supply of large-sized adult horned pout in our ponds. The general complaint is that the horned pout runs small, and various reasons are given as to the cause, such as in-breeding and the small size of the brood stock. All of this is more or less logical, when it is considered that the larger fish are caught out, resulting in a brood stock of smaller fish. Our efforts are being directed, through pond cultural work, toward an annual output for re-stocking purposes, of young fish that have been raised from brood stocks of good size.

## PONDS

### *Public Rights*

Concerning several ponds in the State there has existed a doubt as to whether they are public or private waters in so far as fishing rights are concerned, as the areas have been increased by flowing and there has been no conclusive evidence available to show whether, in their original state, they contained twenty acres.

Since Chapter 12 of the Resolves of 1921 was enacted empowering the Division of Waterways and Public Lands to make surveys of ponds, our Division has requested that the status of the following ponds be established: Coy's Pond, Wenham; Long Pond, Rutland; Long Pond, Blandford; Bungay Reservoir or Greenwood Lake, North Attleboro. A survey of Coy's Pond in 1921 and of Long Pond, Rutland, in 1924, established them as great ponds containing originally more than 20 acres. A special report of the Division of Waterways and Public Lands to the Legislature (House 209, December 31, 1924) indicated that Long Pond, Blandford, is a great pond, and resulted in the enactment of Chapter 102, Acts of 1925, providing for the establishment of a right of way for public access to said pond. A definite ruling on Bungay Reservoir has not yet been received.

A disputed question concerning the right of fishing in privately owned waters has been ruled on by the Attorney General, to the effect that when public fishing is allowed in such waters, the general laws controlling the taking of fish apply the same as in State-owned waters. This notwithstanding the provisions of Section 32 of Chapter 130 of the General Laws, by which the riparian proprietor of any pond, other than a great pond, and the proprietors of any pond or parts of a pond created by artificial flowing, are given exclusive control of the fisheries therein; and the special rights given by Sections 36-37 to persons who enclose the waters of an unnavigable stream for the purpose of cultivating fish. However, this opinion referred only to public fishing in such ponds, and in no way affected the rights of the riparian owners as afforded them by law.

### *Great Ponds Stocked and Closed*

The following ponds were stocked under Section 28, Chapter 130, General Laws, and closed to winter fishing by regulations which in all cases expire November 1, 1928:—

Forge Pond, Westford, Littleton and Groton; Greenwich Lake, Greenwich; Sodium or Chaffin's Pond, Holden; Fresh Pond, Plymouth; Billington Sea, Plymouth; Island Pond (near Great Herring Pond), Plymouth; West Pond, Plymouth; Forest Lake (also known as Welch, Youth's or Harris Pond), Methuen; Watsons Pond (from December 1, 1925), Taunton.

### *Privately-owned Ponds Stocked*

The following privately-owned ponds were stocked with food fish on stipulation of the riparian proprietors that they will permit public fishing therein for ten years from date of stocking:—

Carpenter Reservoir, Meadow Pond and the Whittin Machine Works Pond, Whittinsville (closed from December 1 to April 30 of each year), fishing permitted to February 11, 1935; Roumaine Pond, Medfield, fishing permitted to August 25, 1935; Clarksburg Reservoir Pond, Clarksburg, fishing permitted to October 22, 1935; Browns Pond, Thorndike, fishing permitted to June 11, 1935; Turnpike Pond, Wrentham, fishing permitted to November 7, 1935.



### *Great Ponds Leased for Fishing Purposes*

Under Chapter 39, Acts of 1919, Tisbury Great Pond in Dukes County was leased, for fishing purposes, to the riparian owners for five years from January 1, 1925. Under Chapter 81, Acts of 1896, Chilmark Pond (except the portion known as the "upper pond") in Dukes County was leased, for fishing purposes, to the riparian owners for five years from March 1, 1925.

### FISHWAYS

Work on fishways was carried on through the year as continuously as pressure of other duties permitted. During the alewife run of 1925 all workable fishways were in operation, and were examined periodically from early spring until the beginning of summer. Observations were made on several of the newest fishways by special agents, whose duty it was to regulate the flow of water, to see that a passage-way was provided at all times for the fish, and to keep an accurate record of the species surmounting the ways. In some cases observations were made by night as well as by day.

Surveys were made looking to the eventual installation of new fishways, reports of which will appear on completion.

One of the most important accomplishments of the year was the completion of the final fishway on the Ipswich River, opening this river from the sea to the headwaters, more fully described under "Willowdale Dam."

Alterations in the fishway at Bournedale on the Cape Cod Canal have transformed this way from a practically useless passage into one which promises to be satisfactory in every way.

A wooden fishway was installed during the construction of a new dam by the Montaup Electric Company of Coles River, Swansea, more fully described under "Coles River."

### *Saugus River*

*Universal Tide Power Company.* — It was found that the fish had surmounted this dam without difficulty, and they were discovered below the Wallace Nutting Dam (next above) where they were unable to ascend further.

*Wallace Nutting Dam.* — A new set of plans and specifications was submitted early in January to the owner, the property having changed hands since the matter was taken up in 1922. The owner replied that he would prefer removing the dam sufficiently to let the river flow in its natural channel, rather than to go to the expense of installing a fishway. Examination of the site early in October showed that he had drawn off the pond above the dam to escape the necessity of constructing a fishway. A glance at the conditions above this wooden flume showed a drop of two feet from the floor of the apron, making an impassable barrier to alewives. A few boards, a few stones, and labor, is all that is needed, for the present, at least, to make a good passageway for fish, and this work the owner has indicated his willingness to do.

*Prankers Pond Fishway.* — Late in January plans and specifications were presented to the United States Worsted Company of Saugus, who have signified their willingness to proceed as soon as a proper passageway is provided at the Wallace Nutting Dam, the next obstruction below. One official went so far as to ask our engineer to supervise the construction of this fishway, which he desired to build with his own workmen, then idle on account of a lull in the textile business; but the slow action of the owner of the dam below made this impossible. It is expected, however, that before another season has passed the Saugus River will be completely open from sea to headwaters.

### *Ipswich River*

*Ipswich Mills Fishway.* — Observations were made three times daily at this fishway from April 16 to May 13 by representatives of this Division, and the flow of water was carefully regulated. From April 17 to 30 inclusive a period of un-

usually high water prevailed, making it difficult for fish to ascend the river and making observations practically impossible.

On May 8 and 9 alewives were seen breaking water about one-half mile down the river from this dam and fishway, but they made no effort to ascend the fishway. Waste gas from the gas house may have prevented these fish from ascending further. No fish positively identified as alewives were seen in the fishway itself during the entire season. We continue to receive reports that dyestuffs are deposited in the river by the Ipswich Mills.

From April 16 to May 13 there were 2 shiners and dace, 68 yellow perch, 1 brown trout and 16 miscellaneous fish (eels, pickerel, horned pout, white perch and suckers) that were observed to pass through the fishway, and 30 fish reported as alewives by an unofficial observer.

*Norwood Mills Fishway.*—A straight-run wooden fishway constructed at Norwood Mills in August, 1924, was in operation during the spring and summer of 1925, and proved very satisfactory. Large numbers of fish were recorded as seen during the spring and summer. As early as March 15 (considerably earlier than usual) 75 yellow perch were noticed in the vicinity of the fishway. Through the co-operation of the owner a screen was installed across the stream at the entrance to the fishway, which has been valuable in directing the fish into the lower entrance.

Between April 1 and June 30 there were observed just outside or passing through the fishway, 12 shiners and dace; 119 yellow perch; 1 trout; 39 miscellaneous fish (pickerel, eels, suckers, horned pout, sunfish, minnows) but no alewives.

*Willowdale Dam.*—Upon the completion of the fishway at Norwood Mills relations were reopened with the present owner of the Willowdale Dam, this property having changed hands since negotiations started in 1922.

A conference with the owner, representatives of this Division and a representative of the Salem-Beverly Water Board on March 10 resulted in the preparation of a new set of plans and specifications which were presented to the owner in April. It became known during the conference that the Salem-Beverly Water Board had agreed with the owner to pay for half the cost of constructing the fishway, thereby obtaining certain water rights at this dam. After considerable correspondence and further modification of plans, a cement straight-run fishway was constructed and the work completed on November 12. Our engineer reports it to be a good piece of work, promising to be one of the best fishways yet constructed in the State. Indications are that the piling-up action of the water at the foot of the dam will tend to maintain a high level in the lower end of the fishway, thus making it necessary for the fish to pass only a few steps during spring conditions of the river.

#### *Parker River*

No fishways were installed on the Parker River. Plans and specifications have been for some time in the hands of the owners of the dams on this river where fishways are deemed necessary.

#### *Merrimack River*

*Lawrence Fishway.*—This fishway was in operation somewhat earlier than usual, the river having dropped sufficiently during early April to permit connecting the iron flume with the dam proper on April 14. The fishway itself was in operation from April 14 to June 30. Inspection was made by a representative of this Division during this period, and a special observer was hired to make day and night observations, as well as to regulate the flow of water through the fishway. The first alewives appeared in this stream on April 28, something over three weeks earlier than last year. During the observation period considerably greater numbers of fish were seen ascending than had been true the preceding year, due in part to the earlier opening of the fishway. The figures are: 1,127 alewives; 1,952 shiners and dace; 79 yellow perch; 1,872 miscellaneous species.

The iron flume and overhead iron work were painted again this fall, through the courtesy of the Essex Company who undertook the job, charging for material and



labor only. Preliminary arrangements have been made for repairs to this fishway, made necessary by the severe weather to which it has been exposed several months of each year since its installation. Owing to lack of funds it was not possible to let the contract for this work this year.

*Lowell Fishway.*—Records of the special observer showed that large numbers of alewives and other fish passed over the dam. The first alewives appeared in the fishway on May 17, some 19 days after they were first noticed in the Lawrence fishway. The usual running time between the two dams as recorded for the past two years has been four days. It is possible, of course, that many of those seen at Lawrence so much earlier reached their destination and surmounted this runway unobserved, or may have spawned in that stretch of the river between the two dams. Between April 22 and June 30, the period the fishway was in operation, the following fish were seen ascending the runway: 4,181 alewives (in addition to this number, all the pockets were so full of fish on June 12, 15 and 16 that it was impossible to estimate the number); 354 shiners and dace; no yellow perch; 1 trout; an unrecorded number of eels and suckers. The observer reports a few fish ascending during the day and large numbers at night.

#### *Paskamansett River*

The fishway at Russell's Mills, South Dartmouth, located on what is known as the Cummings Dam, was inspected periodically during the spring run. Unless all the flashboards in the top compartment adjoining the dam are removed, thereby drawing down the pond above to a small stream, the fish are unable to surmount this dam. When the five-year period has elapsed (during which owners of dams who have installed fishways according to this Division's plans are exempt from the necessity of making changes) it will be necessary to require very definite alterations in the design of this fishway.

#### *Taunton River System*

*East Taunton Fishway—Raynham.*—Alewives (seen by our representative) appeared in this stream below the fishway as early as March 26 and 27 on the Raynham side. This is exceedingly early for this locality, and they may have been an advance guard, for no more were seen until some ten days later. Alewives were reported as having returned in greater numbers than ever before, due undoubtedly to the annual planting of adult stock for some years past.

On Sunday, April 27 the visit of motorists from all parts of New England to view the famous herring run, resulted in the greatest traffic jam in the history of the city. Machines could not get within half a mile of the herring run proper, the point where the herrings could be seen to best advantage as they climbed the fishway by thousands to reach the spawning grounds north of the East Taunton Dam.

*Jenkins Leatherboard Company Fishway.*—Frequent observations were made at this fishway (located on Town River at West Bridgewater) by a member of this Division and by the superintendent of the Jenkins Leatherboard Company, who not only made these records but accomplished certain alterations in the lower compartments of the fishway and effected the transportation of alewives by net over the dam. It is indisputable that further alterations are necessary, and as the company has shown great interest, these will undoubtedly be brought about another year.

Previous to April 13 various fish were seen in the fishway in small lots. On the 17th 10 alewives were seen by the superintendent of the company, and 12 on the 18th, as well as several young perch on both dates. The identity of the alewives is certain. During May several schools of alewives were seen in the fishway, as well as large numbers outside in the stream. On May 4,—100 were seen; May 11, 100; May 13,—2 schools of about 50. On May 23 the alewives seen in the stream had disappeared. Some were seen above the dam, proving that they passed through the fishway.

*Stanley Works Fishway.*—The fishway located on the dam of the Stanley



Works (Town River, West Bridgewater) was inspected periodically and observations made during the spring by members of this Division and employees of the Stanley Works Company, who regulated the flow of water and kept records of all fish seen in the fishway. On May 6 two alewives were seen in the fishway, and on May 4, four. This is the second year these fish have appeared after having been absent many years, and on June 3 one was captured about one-half mile above the fishway, which is additional proof that many undoubtedly passed through when observers were not at hand. It has been suggested that a screen be installed from the lower end of the fishway across the stream, thus helping to guide the fish through the way, and this suggestion will be presented to the Company shortly.

*Easton Investment Company Fishway.* — This fishway (located on the Town River, West Bridgewater) was in operation between March 16 and May 31, in good working order, and observations were made periodically. A resident near the fishway reported seeing yellow perch in the fishway on March 15, and a representative of this Division saw perch and pickerel there on March 16. This is particularly early for these fish to appear at this location. No alewives were seen during the period observations were made.

*Hanson Cedar Company Fishway.* — The fishway located on the property of the Hanson Cedar Company, Stump River, Halifax, was inspected during the spring run and early summer by a representative of this Division, but no fish were seen.

The same conditions were found to exist as for the past two years, viz., that when the water is low in the river, the base of the run in the top compartment is not low enough in the bed of the stream to allow water to flow through the fishway. At the time this fishway was installed, the drouths which have been experienced in the past two years were not anticipated. The owners will be requested next year to make alterations, and if they are unwilling, the Division after the expiration of five years after installation will require them to do so.

*Carver Cotton Gin Company Fishway.* — Examinations were made at this fishway (located on the Satucket River, East Bridgewater) by a representative of this Division starting early in April and continuing through May. No alewives or other fish were observed in the fishway during inspections; in fact, the alewife has not yet appeared in this branch of the Taunton River system.

This fishway was installed five years ago and has never functioned satisfactorily, careful check having been made year by year. As five years have passed since the installation, the owners may now be required to alter the fishway. The matter has been called to the owners' attention, and they have signified their willingness to receive suggestions.

*Electric Light Power Plant Fishway and Star Mills Fishway.* — Frequent inspections were made of these two fishways (located on the Nemasket River, Middleboro). They were found at all times properly regulated, with large numbers of alewives ascending.

At the Electric Light Power Plant fishway it is difficult for the fish to surmount, and they show evidence of being exhausted by the time they have reached the top compartment. It is expected this condition will be remedied before another season. The town took considerable interest in both the fishway and the fishery. A man was hired to prevent trespass on the grounds adjoining the fishway and disturbance of the fish. The fishery was sold for five years to George M. Besse of East Wareham, who permitted all the fish to run to the spawning grounds. One of the biggest runs through these fishways occurred May 17 and 22, similar to the big run at the East Taunton fishway. These same fish reach, eventually, the Middleboro fishways.

The fishway at the Star Mills below Wareham Street was in good working condition, with large numbers of fish in every compartment, surmounting without difficulty.

#### *Agawam River — East Wareham*

The usual annual inspections were made of the fishway on this stream. Mr. George M. Besse of East Wareham operated the fishway again this year with his

usual interest and enthusiasm, regulating the flow of water and allowing large numbers of alewives to surmount the fishway to the spawning beds.

### *Monument River*

*Bournedale Fishway.* — Early in March the selectmen of Bourne notified this Division that alewives were having difficulty in surmounting this fishway. After conferences between the Division's representatives, the selectmen and the engineer for the Boston, Cape Cod and New York Canal Company, the necessary alterations were planned, to which the company agreed. This fishway has never functioned properly since its installation, because the lower compartments were not extended far enough out into the Canal, and all in general were designed too long, allowing for no resting pockets while the fish were making the run. This fishway has been in a dilapidated condition for several years. By the middle of November a fine, well-constructed fishway had been completed, which is expected to withstand the severe conditions to which it is exposed both from weather and tide action. The need of cleaning out the stream between the fishway and headwaters of the river (now full of debris and obstructions) has been taken up with the selectmen. Handled properly, this stream could be one of the most valuable alewife fisheries in the State and bring considerable revenue to the town.

### *Red Brook — Cataumet*

Observations were made during the spring in the fishway on Red Brook, Cataumet. It is in a very bad state of repair, no changes having occurred in conditions during the past year, and alewives are unable to reach the spawning beds. The Red Brook Pond above the fishway is one of three ponds controlled by L. B. Handy of Wareham, who leases it from the Estate of H. R. Baker, which has a deed of all land flowed by the dam at the present highway. Since the fishery on Red Brook is controlled by the town of Bourne, and no alewives are reaching the pond, this is a matter for the town to take up with the lessee, and it has been brought to their attention.

### *Cole's River*

*Montaup Electric Company Fishway.* — During the construction of a new dam by the Montaup Electric Company of Somerset on Cole's River, Swansea, a new wooden fishway was installed last May, of the type known as the Keil. Inspection during the spring run showed that fish were able to surmount the fishway easily. The company will be asked to make certain alterations and corrections before the fishway is accepted, as they proceeded with its construction without first securing approval of the plans and specifications.

## POLLUTION

No serious pollution problems arose during the year. Such as were brought to our attention were investigated and handled in the usual manner.

## PROPAGATION OF FISH AND GAME

### FISH HATCHERIES AND GAME FARMS

#### *General*

No appropriation was received for construction at the fish hatcheries and game farms, making it impossible to carry out the plan of enlarging the stations to permit rearing a large proportion of the stock to adult size before liberation. Hence no changes were made, except such as could be paid for from the funds contributed by the fish and game associations (mentioned under "Acknowledgments") and from some very small balances remaining from the previous year.

The most important change during the year in the method of pheasant propagation was the adoption of the old English system of controlling the birds by use of the brail. The brail is a Y-shaped piece of leather or rubberoid, and is riveted



around one wing in such a way as to prevent flight. The device will permit carrying large numbers of birds in open pens, whereas the work heretofore has been confined to covered pens. The result will be more economical operation, and the production of a stronger and better bird by reason of the greater freedom and variety of food made possible by the larger range. It has been found that on removal of the brail the bird has full use of its wings. The brail is occasionally shifted from one wing to the other. It has the advantage over the method of clipping the flight feathers, in that the bird is in condition for liberation at any time should this become desirable.

#### *Ayer Game Farm*

The opening of the year found the station with a brood stock of 390 pheasants on hand, and with half its complement of pens completed and in use, the 32 pens being linked up into compound units or strings of four pens each. Each string was used to winter 50 birds. Construction was well under way on the duplicate set of 32 pens which would be required for breeding operations in the spring.

The birds wintered well, with a very low rate of mortality, and the laying season began with 379 on hand. The first eggs were picked up on March 31, and by April 10 the daily production was over 50 and shipment of eggs was begun. There were 12,773 eggs collected, of which 12,333 were distributed to applicants with very slight losses.

Distribution of the brood stock, numbering 348 birds, was made between June 20 and July 7. Considerable loss was sustained among the hens throughout the breeding season, through injuries caused by the cocks and through injuries and lesions of the ovarian organs, due to the excessive strain of heavy egg-production. The average production per hen, from April 1 to June 30, was over 40.

With the distribution of the brood stock the operations at the station came practically to a close, but a considerable amount of general farm work was carried on through the summer and early fall, in anticipation of next year's activities. The year closed with part of the coming season's brood stock on hand, 201 pheasants from the Sandwich Bird Farm.

#### *Marshfield Bird Farm*

Toward the end of 1924 a yard was commenced designed to hold brailed stock, but freezing weather delayed its completion until the late spring of 1925. It encloses a large area, and contains some 1,600 feet of fence 7½ feet high, constructed with a view to preventing anything from digging under. The first 1½ feet above ground are of creosoted boards; the next 3 feet of fine mesh wire; and the remainder of 1½-inch mesh wire, finished at the top with 2 x 4 planed. Being designed for brailed stock it is uncovered. Shelters and hiding and nesting places of boughs were built all over the yard, and the stock turned loose; but the rivets on the brails proved not strong enough, the birds opened them with their bills, and a number of pheasants escaped. Traps were set and a good many were recovered. This failure of the brails made necessary the recapture and rebrailing of the brood stock, and their return to the old yards, which set them back at least three weeks on laying. All through the summer the problem of a better brail was studied, and in early fall a special tool and a strong new rivet which the birds cannot remove, were designed by the superintendent.

Land was dressed, plowed and laid down to clover and planted to green stuff for the birds in the spring, and the yards spaded and limed. The pens were filled with from 6 inches to 2 feet of loam, this being necessary since the pens, originally designed for duck pens, are on low land. These yards have always been used the entire year, beginning with the brood stock for winter and young stock for summer, with no period of rest. It is planned to let them lay over the winter unused. Late in the summer when the hardest work of the season was over the yards in front of the houses on the hill were completed, giving four houses with yards similar to the large one, but of wire of smaller mesh to permit colonizing young birds there if necessary.



The year opened with 804 adult pheasants on hand as brood stock, which was reduced, by losses of 41 and distribution of 159, to 604 by the opening of the laying season. There were 15,627 eggs collected, and at the end of the egg-laying period all the adult stock was released. This was done with the intention of changing the entire stock, as the brood stock has not been replaced, as a whole, since starting with the incubator stock several years ago. There were 15,525 eggs set, 7,793 birds hatched, and 1,738 reared, of which 306 were distributed to the covers, 159 sent to clubs to be held over winter and liberated in the spring as adults, and 1,273 transferred to the adult stock.

The adult stock is accounted for as follows: on hand at the beginning of the laying season, 604; increased by stock purchased, to 704; and by addition of the 1,273 birds of the present year's hatch, to 1,977. This adult stock was disposed of thus: 133 lost (115 lost experimenting with the rail), 464 distributed after close of laying season; 600 reserved for brood stock; 100 sent to the Wilbraham Game Farm; 100 held for brood stock at Wilbraham, 199 held for brood stock for the Ayer Rearing Station; and 381 held for distribution in the covers in the spring as adult stock.

#### *Sandwich Bird Farm*

A small balance from the previous year made it possible to enlarge the large wintering and breeding yards to the extent of adding a 20 x 300-foot section on the easterly side; to complete the cementing of the floors of the brooder houses; and accomplish various other small matters, so that the station seemed better equipped than ever before to handle the stock. But as the season advanced the brooding space proved insufficient, which handicapped the work to some extent. Soon after this, funds contributed by the fish and game clubs became available, and with a portion of it (and salvaged lumber from Carr Island), additional quarters were provided by converting six chicken houses into brooder houses with new covered yards in front, making a continuous divided yard 120 x 30 feet in size. From the extreme southerly corner of this covered yard was constructed an open yard 8 feet high, suitable for brailed birds. From the southeasterly corner of this latter yard, another open yard was extended southerly and parallel with the original brooder pens, and utilizing one side of the latter as part of the yard, completed this second open yard of about 500 x 60 feet.

The year opened with 532 adult birds on hand as brood stock, which was reduced, by losses of 17, to 515 at the beginning of the laying season. There were 16,031 eggs collected and set, 8,848 birds hatched, and 5,151 reared, of which 1,791 were distributed to the covers, 2,298 sent to clubs to be held through the winter for liberation in the spring, 306 sent to the Wilbraham Game Farm, 242 distributed as adults to the covers, 4 sent out to be held through the winter, 201 sent as adults to the Ayer Game Farm, and 309 added to the brood stock.

The adult stock is accounted for as follows. On hand at the beginning of the laying season, 515; lost, 26; distributed to the covers, 228, reducing it to 261. The addition of the 309 birds of the present year's hatch, and 25 purchased, brought the brood stock at the end of the year to 595.

Through the courtesy of Judge Lee Miles of Arkansas 24 quail were received, but they did not stand the trip well, and nearly all died soon after arrival.

#### *Wilbraham Game Farm*

With the greatest regret we record the death of Superintendent Joseph H. Mosher on July 21. In the passing of this veteran game breeder the Commonwealth lost a valuable and conscientious employee, and the sportsmen a friend to whom, whether they were aware of it or not, they owed a debt of gratitude for the up-keep of their sport. Mr. Mosher's connection with game breeding dates from 1898, when he entered the employ of the State, working at the Winchester Hatchery with Commissioner Brackett on the task of introducing the pheasant as a game bird into Massachusetts. Upon the establishment of the Wilbraham Game Farm in 1912 he was made superintendent, and his work has been cut short just at the time when his experience and skill were beginning to count the most. It is fortunate that

through close association with the work over many years Mrs. Mosher has, to a certain extent, fallen heir to the knowledge which he gathered, and she was appointed as superintendent of the game farm on August 1.

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During the winter months all building, replacement and repair work was attended to. There were built for future use five 10 x 20-foot brooder houses (four floored with cement), divided into sections, each with a yard. Four of the yards are 20 x 48 feet and the other six 20 x 36. Through the courtesy of the Paper City Rod and Gun Club (by a contribution made late in 1924) there were added to the equipment one 10 x 20-foot house with two 20 x 48-foot yards, without cement floor. Considerable green food was raised and stored for winter use of the birds.

The year opened with 631 adult pheasants on hand as brood stock, to which were added 38 purchased birds. Distribution of 23 and loss of 20 brought the number to 626 at the beginning of laying time, and 23,144 eggs were collected. There were 22,960 eggs set and 8,033 birds hatched. Very early in June an epidemic of some unknown disease attacked the young birds between three and four weeks of age, which as far as could be determined by observation proved fatal in every instance. Previous to this the losses among the young chicks had been small compared with other years. Every precaution was taken to prevent the spread of the disease, without any visible result. A certain per cent of a hatch would be diseased, and the remainder immune. In one pen the birds would appear to be healthy, and in the next pen, separated only by a wire netting, almost all of the chicks would be lost. After everything possible had been tried to determine the cause of the disease, the conclusion was reached that a part of the brood stock was infected with bacteria which was transmitted to the young through the egg, and developed to a fatal stage in the chicks at about four weeks of age.

The losses from this epidemic were 5,541 birds, and 71 were lost and unaccounted for (due no doubt to the confusion attending the sudden illness and death of the superintendent), reducing the number reared to 2,421. Of these 2,336 were distributed to the covers, and 85 remain on hand for later distribution. On account of the possibility of disease, none were kept for brood stock.

To the adult stock of 626 with which the laying season began there were added 300 from the East Sandwich Bird Farm, 97 from the Marshfield Bird Farm, and 100 purchased. Deducting losses of 62 and distribution of 575 there were 486 left on hand at the close of the year.

### *Amherst Rearing Station*

Using a portion of the funds contributed by the clubs, changes were made in the ponds to increase their capacity for carrying over a selected stock of fingerlings to be liberated next year as fish large enough to be caught when planted. This work was confined to building five new ponds, 6 concrete and 2 wooden dams. Minor repairs and additions were made to the dwelling house. The station was opened February 23 to prepare to receive stock.

*Brook Trout.* — Stock for rearing was received as follows: fry — from the Montague Rearing Station, 200,000; from the Palmer Hatchery, 273,000; from the East Sandwich Hatchery, 200,000; fingerlings — from the Palmer Hatchery, 5,000; from Montague Station, 10,000; yearlings — from Montague Station, 800 (6-inch); from Sutton Hatchery, 2,500 (5-7 inches).

The work of the station proceeded without special incident, and the stock was disposed of as follows: 344,700 fingerlings planted in public waters; 4,000 to the Carter Pond Company in exchange for horned pout (see Fish Distribution); 18,000 held for distribution in the spring as yearlings.

There were planted in public waters 3,000 yearlings.

*Brown Trout.* — Brown trout were reared for the first time at this station, with very good results. The stock consisted of 16,000 fry from the Palmer Hatchery, and 760 fingerlings (1½ to 3½ inches) from the Montague Station. The entire



production of 8,000 fingerlings was set aside for brood stock, and there are on hand at the close of the year 7,760.

*Loch Leven Trout.* — There were 11,000 Loch Leven trout fry received from the Palmer Hatchery for rearing. This first experiment with this species at this station gave good results, and the 4,000 fingerlings which resulted were kept for brood stock.

### *Montague Rearing Station*

Along with the general work four old-style hatching troughs were converted into sorting boxes; all dams were removed and holes in the sides and bottoms stopped up with lead; screens were made, painted and later set outside the cement foundations prepared last season; and covers were made and painted. Several hundred small pines were planted back of the ice house, and a few cedars and spruces along the brook.

With the funds contributed by the clubs, certain of the ponds were enlarged for the purpose of growing yearling fish, and some of the worn-out wooden dams were replaced with concrete. Other ponds were enlarged to get the maximum benefit from the water supply. Using lumber salvaged from the buildings on Carr Island a small camp was partly constructed, so that the fish messengers in charge of the distribution by truck could be accommodated on the premises, and the superintendent have a comfortable place in which to do the clerical work of the station in winter. When all of the fish had been distributed out of the main system, it was thoroughly cleaned and sterilized.

*Brook Trout.* — The year's work started early, to prepare the equipment to receive the egg supply. The 80,000 eggs taken at the station came along with only normal losses. To them were added 200,000 from the Sandwich Hatchery and 853,000 from commercial dealers, a total of 1,133,000. From them 931,000 fry hatched, of which 200,000 were sent to the Amherst Station. There were heavy losses during hatching in one lot of commercial stock. The remainder made rapid growth, with very small losses, and by the first of May it was necessary to distribute some of the larger ones, for the entire stock grew so well that the pools were crowded.

The year's production of fingerlings, together with 10,250 fingerlings ( $3\frac{1}{2}$  to 6 inches) brought over from the year before, was disposed of as follows: 20,000 to the Sutton Hatchery, 10,000 to the Amherst Rearing Station, 8,000 to the Ashfield Fish and Game Association and 5,000 to the Worcester County Fish and Game Association for further rearing; 448,650 to public waters (which number included the 10,250 large fingerlings), and 15,000 remain on hand to be carried through the winter for distribution as yearlings in the spring.

The stock of adults and yearlings (1,000 on hand at the beginning of the year plus 9,750 from the stock of fingerlings brought over from last year) were disposed of as follows: 800 to the Amherst Rearing Station and 9,346 distributed to public waters.

*Brown Trout.* — From the Palmer Hatchery 10,000 brown trout fry were received and placed in one of the best rearing ponds; but, due to an underground spring, the pond lowered over night and most of the fry were lost. When the remaining 760 had reached  $1\frac{1}{2}$  to  $3\frac{1}{2}$  inches in size they were transferred to the Amherst Station for further rearing.

*Miscellaneous Distributions.* — There were sent to the Eastern States Exposition for exhibition purposes 100 fingerling brook trout (4-inch) and 48 adults (7 to 18 inches), which were afterwards planted in public waters.

### *Palmer Fish Hatchery*

In the spring the rearing pools were put in order, having to some extent been affected by frost conditions. Late in the fall the bank between the bass ponds and the brook was strengthened by hauling in additional earth and stones preliminary to grading and facing up the brook side of the ponds and to prevent muskrats from digging through. During the late fall most of the bass ponds were



thoroughly cleaned, resulting in the removal of a large amount of vegetation. Before the freeze-up two concrete raceways were put in two of the bass ponds to replace worn-out wooden structures. Later in the year three additional concrete raceways were completed, leaving three more to be put in place. A larger water supply for hatching was secured by replacing the 4-inch pipe with a 6-inch one. Work in the remaining portion of the year was confined to the routine of the station.

*Small-mouth Black Bass.* — There was a very successful hatch of small-mouth black bass, and 96,000 fry and 55,400 fingerlings were distributed to public waters, as well as 75 yearlings.

*Brook Trout.* — Eggs were received as follows: 300,000 from the Sandwich Hatchery and 440,000 from commercial dealers. From the 740,000 eggs there were 703,992 fry hatched, of which 273,000 were sent to the Amherst Rearing Station and 170,000 to the Sutton Hatchery. Three hundred were furnished to Holyoke College for class use.

The stock of fingerlings was distributed as follows: 74,000 to the Sutton Hatchery, 5,000 to the Amherst Rearing Station, 6,000 to the Worcester Rearing Station, 15,000 to the Springfield Fish and Game Association, 68,300 distributed to public waters, and 300 remain on hand.

There were planted in public waters 5,630 yearlings.

*Loch Leven Trout.* — There were 50,000 Loch Leven trout eggs received through the courtesy of the U. S. Fisheries Station in Montana. They arrived in good condition, and hatched with a very small loss. To the Amherst Rearing Station were shipped 11,000 fry, to the Sutton Hatchery 3,500, and to the Sandwich Hatcheries, 3,600. The 7,700 on hand at the end of the year are being reserved for breeders.

*Brown Trout.* — There were 150,500 brown trout eggs purchased in New York, and 3,000 collected at the station. Of the fry hatched 16,000 were sent to the Amherst Rearing Station, 10,000 to the Montague Rearing Station, 10,000 to the Sandwich Hatcheries, and 13,400 to the Sutton Hatchery. The 15,000 on hand at the end of the year are being reserved for breeders. It is estimated that the losses from herons (of which 16 were trapped or shot) amounted to between 15,000 and 20,000.

There are on hand at the end of the year 600 yearlings and 5,628 adults.

*Horned Pout.* — Horned pout held in ponds at the station produced 14,000 fingerlings, which were distributed to public waters. There are on hand in the station ponds, for later distribution, 30,000 fingerlings (1½ inch) and 6,160 adults (6–8 inches) which were secured from the Carter Pond Company near the close of the year.

*Blue Gills.* — Blue gills numbering 800 (1 to 3-year-olds) were sent to the Stockwell Ponds for brood fish.

*Miscellaneous Distributions.* — There were sent out for exhibition purposes, and afterwards planted in public waters, the following: To the Eastern States Exposition, 150 fingerlings (3 inch) and 8 adult (12–15 inch) small-mouth black bass; 155 fingerlings (3 inch), 11 yearling (12 inch) and 4 adult (15 inch) brown trout; 165 2-year-old blue gills; 75 fingerling (3 inch) and 50 adult (8 inch) yellow perch; 150 fingerling (3½ inch) Loch Leven trout; 200 fingerlings (2–4 inch) and 35 adult (12 inch) horned pout; 11 adult (12 inch) pickerel. To the Worcester Fair, 150 fingerlings (2–4 inch) and 6 adult (12–15 inch) small-mouth black bass.

### *Sandwich Fish Hatcheries*

At the East Sandwich Station four of the old wooden pools were rebuilt, making them into dirt pools. Other pools were enlarged and made into dirt pools by removing the board sides.

At Sandwich three large dirt pools (15 x 200 feet) divided into six ponds by dams placed across the center of each, were constructed and paid for by the money contributed by fish and game associations. Six wells were driven to supply them

with water. These ponds are for the purpose of rearing the stock to larger size before planting.

*Brook Trout.* — In the fall of 1924 there were 1,843,000 eggs collected, hatched and reared with no unusual incidents. There were 50,000 eyed eggs planted in brooks for natural hatching, and to the other stations were sent: to Palmer Hatchery, 300,000; to Montague Rearing Station, 200,000. Fry: to Sutton Hatchery 180,000 (1-inch); to Amherst Rearing Station, 200,000 (1-inch); fingerlings: to Dighton Rearing Station, 10,900 ( $1\frac{1}{4}$  to 3 inch); to Canton Rearing Station, 26,000 ( $1\frac{1}{4}$  to 2 inch); to Worcester Rearing Station, 44,800 ( $1\frac{1}{4}$  to  $1\frac{1}{2}$  inch); to Peabody Rearing Station, 26,000 (3 to  $3\frac{1}{2}$  inch); to public waters, 227,800 (3-inch); and at the close of the year there are on hand 75,850 for rearing to yearlings for spring distribution, and 10,000 which are held for brood stock. There were distributed 13,075 yearlings and 2,377 adults, and 7,828 yearlings and adults remain on hand.

*Brown Trout.* — There were received from the Palmer Hatchery 10,000 brown trout fry for rearing. This was new work, tried as an experiment, and not particularly successful. The resulting 472 fingerlings will be held for brood stock.

*Loch Leven Trout.* — There were 3,600 Loch Leven trout received from the Palmer Hatchery for rearing. Results were better than with the brown trout, and 3,359 fingerlings are being held for brood stock.

*Chinook Salmon.* — From the California Fish and Game Commission 100,000 Chinook salmon eggs were received (in exchange for brook trout eggs bought from dealers) from which 61,000 fingerlings (3-4 inch) were reared and planted in public waters.

#### *Sutton Fish Hatchery*

At the close of 1924 the wooden nursery pens at the hatchery were removed and ponds to cover the same area were started. Concrete divisions for these ponds were built in December, utilizing the old concrete foundations for the pens. This change resulted in larger and better fish from the same area and water supply. No further improvements could be made, except of very minor importance, as the time otherwise available for such work was taken up by distribution and work at the Stockwell Ponds.

*Brook Trout.* — Trout rearing started with a somewhat larger stock than that of the previous year, and gave nearly the same results. Stock was received as follows: fry — from Palmer Hatchery, 170,000; from Sandwich Hatcheries, 180,000. From these were raised 311,700 fingerlings, to which were added for further rearing 20,000 from the Montague Station, and 74,000 from the Palmer Hatchery, making a total of 405,700 to be handled at the station.

The drouth conditions persisted over fall, winter and spring, and made necessary a thinning-out distribution in June, about a month earlier than usual. This, however, resulted in better fish later in the season, and it was impossible to carry a large lot until the streams were flowing well, and to make a better selection to reserve for yearling stock for the next year.

The year's product was disposed of as follows: 31,000 to the Worcester County Fish and Game Association, 189,100 to public waters, and 36,000 remain on hand for rearing to yearling fish.

There were 2,500 yearlings sent to the Amherst Rearing Station and 2,100 to public waters.

*Loch Leven Trout.* — Loch Leven trout fry numbering 3,500 received from the Palmer Hatchery, were placed in the large pond to grow there with the brook trout, as had been tried with brown trout. They gave fair results, but did not make as satisfactory growth as did the brown trout. The entire 800 were retained at the station for brood stock.

*Brown Trout.* — There were 13,400 brown trout from the Palmer Hatchery placed in the upper west pond, but made a very poor start and slow growth. They appeared to pick up somewhat when some of the smaller trout fry, a more active-feeding fish, were put with them, but quite early in the summer a blow-out under the concrete let them down into the next pond among a lot of larger trout, and they



remained mixed until the end of the year and are still on hand numbering 1,200. This possibly resulted in a better growth, at the expense of numbers.

*Horned Pout.* — The horned pouts salvaged from Pond Meadow, Weymouth (See "Salvage" under "Fish Distribution") were brought to the Sutton Hatchery and thence distributed. 2,500 remain on hand for future disposition.

*Miscellaneous Distribution.* — There were sent out for exhibition purposes, and afterward planted in public waters, the following: To the Worcester Fair, 75 fingerling (5 inch) trout. To the Springfield Fair, 7 adult (15 inch) rainbow trout; 10 adult (10 inch) brook trout; 10 adult (7 inch) blue gills. To Leominster Fair, 10 adult (10 inch) brook trout, 15 adult (7 inch) blue gills, 25 adult (9 inch) yellow perch; 10 adult (15 inch) pickerel, 10 adult (9 inch) horned pout.

## FIELD PROPAGATION

### *Pond Cultural Work*

*Shaker Mill Pond.* — The Shaker Mill Pond project has proved unsuccessful and will be abandoned. This is through no fault in the general plan or in the equipment, but because water conditions have made it impossible to handle this pond profitably. Since the time the work was started the watershed has been almost entirely cut over, resulting in the extremes of flood or drouth. In the early spring there is so much water that it cannot be carried off through the spillway and gates, and many of the fish go over the dam. Later, during dry weather, the feeding stream dries up and the pond is reduced to a mere shallow pool. The movable equipment will be taken away for use elsewhere, and the remaining fish distributed.

*Stockwell Ponds.* — At the opening of the year (December 1, 1924) the work of the season at the Stockwell Ponds had not been completed. December was occupied largely in finishing the work, making the distributions and returning the brood fish to the ponds. While the ponds were down as many improvements as possible were made to facilitate the run of fish down the ponds, and their handling; the brush was cut out of the channel in the upper part of No. 2, and many logs and other obstructions that diverted the water were removed. The section of channel in the lower part of No. 1, the old mill pond, where the fish are concentrated for catching, was widened and deepened by sluicing the mud down through the trap.

The trap was protected from floating debris that rises from the bottom in great quantities when the pond has been drawn long enough to dry the unburned brush thrown on the bottom, by a plank shield built across the outlet, which holds the drift until a change of wind drives it up the pond. Following this work, cutting was resumed.

In the spring only necessary repair work was done. Much of the open land around the ponds was replanted with pine and spruce.

In the restocking of the ponds for 1925 some changes were made. The pickerel were concentrated in No. 1 pond, largely, to separate them from the blue gills which were segregated in No. 3 on account of the tendency of the fingerlings to drift out of the ponds, and No. 3 having the least outflow they would be less likely to work down among the pickerel, and could be readily let down to No. 2 when this pond is fitted for growing yearlings. Horned pout were put in all ponds, as they seem to fit in with any fish. Yellow perch were not returned to the pond for breeding, white perch being substituted. No results came from this trial. There was no evidence of breeding, and only 3 of the adult stock of 3,000 put in were found. This lack of success may have been due to bringing the fish from a very dissimilar type of pond, coupled with their arrival in a very exhausted condition at the beginning of very warm weather.

The breeding and rearing conditions as shown by drawing the ponds indicated that horned pout did well in all ponds, but made the best growth in No. 1. Pickerel produced a larger number of fingerlings, but of smaller size, and this production was nearly all in No. 1. In No. 2 the pickerel appeared to have been winter-killed, and the same happened to many of the blue gills left in this pond, and to some of the main stock left in No. 3, as was determined by many dead fish embedded in the



ice and seen as it melted, and many remains found on the bottom, where they had changed to a solid condition, instead of decaying. The loss of pickerel in No. 2 appeared to have been nearly total, due to abnormal drouth conditions and ponds freezing at a low stage of water. The blue gills bred well in No. 3, and this appears of all the ponds to be the best in which to breed them under control, and with the filling at the dam completed, screens installed, trapping and separating pools built below the dam, either fingerlings or yearlings can be produced as desired, and handled without loss.

The distribution for 1925 was started early, to handle a stock of fish that was expected to be larger, and taken from the ponds under greater difficulties. There were distributed between December 1, 1924, and November 30, 1925, 3,600 blue gills (2-4 inch); 67,800 horned pout (2-4 inch); 12,950 yellow perch (5 inch); 7,600 pickerel (4-6 inch); and at the close of the period covered by this report there are on hand 75,000 fish which have been taken from the ponds but not yet distributed, and remaining in the ponds a number of which no accurate estimate can be formed.

During the year the following was planted in the pond as breeding stock: 3,000 white perch secured by the salvage crew, and 800 blue gills from the Palmer Hatchery.

## FISH AND GAME DISTRIBUTION

### FISH DISTRIBUTION

The method of distributing the stock raised at the fish hatcheries, or secured by salvage, differed but little from other years, though a few changes have been made which should be productive of better results. As usual, many clubs called at the stations for their allotments. In the western part of the State, trucks were used to transport fish to remote sections, train service on several lines having been discontinued. The cost of fish distribution was \$4,510.20.

Distribution tables appear at the end of this section, to which reference is made to supplement the following reports on the various species.

*Brook Trout.* — Fifty thousand eyed eggs were planted in two brooks as a special experiment, and produced good results. This method of egg-planting is successful if care is taken to place them in shallow spring feeders, where there is no rapid rise from heavy rainfall or melting snow.

Fewer fingerlings were distributed than in other years, on account of the number reserved for rearing to larger size. Recognizing the general demand from the sportsmen for the planting of fish of larger size, definite steps were taken to bring about such a distribution next spring. Rearing pools were altered and some new ones constructed, and 145,150 selected fingerlings are being held at the stations for distribution in the spring as yearling fish, most of which will be large enough to be caught when planted. From now on it will be our policy to reduce the present facilities for producing fingerlings, and wherever practicable converting waters now used for that purpose into pools for yearlings. In other words, to aim at the maximum production of yearlings and the minimum of fingerlings, while operating all stations at capacity.

*Brown Trout and Loch Leven Trout.* — Without intending to start any controversy as to the difference between the brown trout and the Loch Leven trout, we have fallen into the habit of referring to the eggs and resulting fish from stock obtained in the eastern part of the country as "brown trout," and the eggs and fish received from the U. S. Bureau of Fisheries stations in the western states as "Loch Leven." Our experience of the past year has shown that the western eggs have greater vitality and the young fish feed more readily and grow better than the stock from eastern sources. Our past experiences with the eastern eggs at the Palmer Fish Hatchery having been unsatisfactory, we divided the fry hatched at the Palmer Station among the other stations for rearing in order to compare the results. Collectively we produced more fish by this plan, though the experience at practically every station was that the western eggs seem to be superior in every respect.

For several years we have been trying, with very indifferent success, to build up a brood stock of brown trout in order to have an independent supply of eggs. From now on our efforts will be devoted to the Loch Leven or the western fish.

Except for a small number exhibited at the Eastern States Exposition and thence planted in public waters, no distribution of such trout was made this year, the entire product being held for brood stock.

*Rainbow Trout.* — No rainbow trout were purchased on account of lack of funds, but arrangements have been made for securing a supply of eggs for 1926 hatching by an exchange of brook trout eggs with the U. S. Bureau of Fisheries.

*Chinook Salmon.* — The Chinook salmon produced at the Sandwich Hatcheries were planted in the following ponds: Peters Pond, Sandwich; Cliff Pond, Brewster; Sheep Pond, Brewster; Ashumet Pond, Falmouth and Mashpee; Grigson's Pond, Barnstable; Bloody Pond, Plymouth.

*White Perch.* — A new method was adopted in the distribution of white perch, since our stocking operations over a period of years, while successful to a certain degree, have not been as fruitful of results as desired.

When the fish have been put out on individual applications, leaving the applicant to select the pond in which to deposit them, a wise choice has not always been made, since applicants have failed to consider such important points as the nature of the ponds, their importance as fishing waters, the comparatively small outlets which would prevent the fish from leaving the waters, the matter of screening the outlet, and the need of repeated stockings to get the desired results.

By the new plan a group of about twenty-five ponds, representing all parts of the State, was selected for intensive stocking, and each pond received several shipments, which were handled between the railroad station and the pond by the local fish and game club, accompanied by the district warden to insure their liberation in the waters selected. By this concentration on a limited number of ponds more satisfactory results will undoubtedly follow. Next year another series of ponds will receive attention, and so on, in this way eventually stocking heavily every pond suitable for white perch.

Much time was devoted to classifying and selecting the white perch ponds. The stock for distribution was secured in the usual way by the salvage unit.

*Salvage Work.* — Due to lack of funds the regular salvage crew operated this year only at Tashmoo Pond on Martha's Vineyard. This is the first time since 1922 that the pond has been fished, and 133,900 adult white perch (4 to 6 inches) were secured. Of these, 3,000 were sent to Stockwell Ponds as brood fish, and the remainder distributed. The number collected is proof that this pond is not fished out, and that the policy of letting the pond rest at intervals is the proper one. The ponds selected for intensive stocking with white perch are: Garfield Lake, Monterey; Center Lake, Becket; Davol Pond, Westport; Sasquin Pond, New Bedford; Baldpate Pond, Boxford; Chebacco Lake, Essex-Hamilton; Foster's Pond, Andover; Ashfield Pond, Ashfield; Forest Lake, Palmer; Hazzards or Russell Pond, Russell; Watershop Pond, Springfield; Goshen Reservoir, Goshen; Quabbin Lake, Greenwich; Massapoag Pond, Dunstable-Groton-Tyngsboro; Quannapowitt Lake, Wakefield; Long Pond, Littleton; Whitehall Pond, Hopkinton; Upper Mystic Lake, Winchester; Massapoag Pond, Sharon; Mirimichi Pond, Plainville-Foxboro; Robbins Pond, East Bridgewater; Long Pond, Plymouth; Mary's Pond, Rochester; Snow's Pond, Rochester; Browning Pond, Oakham; Queen Lake, Phillipston; Bad Luck Pond, Douglas; Lower Naukeag Lake, Ashburnham; Wallum Pond, Douglas.

Various small salvage jobs by wardens and superintendents yielded the following stock, planted as a rule locally, or used for exhibition purposes at fairs and thence distributed. Horned pout: from Pond Meadow, Weymouth, 18,500 (2 inch); from Haynes Reservoir, Leominster, 422 adults (8 to 10 inches); from Rockwell's or Wheatland's Pond, Topsfield, 50 (4 inch); from Creighton's Pond, Middleton, 1,005 (5 inch-10 inch); confiscated from a fisherman, 65 adults (4 to 8 inch). Pike perch: from Lake Massapoag, Sharon, 6 adults. Small-mouth black bass: from Meeting House Pond, Westminster, 31 (8-14 inch); from Shuttle



Shop Pond, Sutton, 5 adults (10-inch). Large mouth black bass: from Shuttle Shop Pond, Sutton, 10 adults (10-inch). Yellow perch: from Indian Lake, Worcester, 15 adults (9-inch); from Chauncey Lake, Westborough, 15 adults (9-inch); from Barker's Brook, Pembroke, 81 adults. Pickerel: from Shuttle Shop Pond, Sutton, 25 adults (17-inch). White perch: from Indian Lake, Worcester, 25 adults (8-inch); from Chauncey Lake, Westborough, 100 adults (8-inch).

*Small-mouth Black Bass.* — The bass distribution was handled on the same plan as that of the white perch. The ponds selected were: Gull Pond, Wellfleet; Onota Lake, Pittsfield; Garfield Lake, Monterey; Sabatia Lake, Taunton; Foster's Pond, Andover; Four Mile Pond, Boxford; Flax Pond, Lynn; Nile's Pond, Gloucester; Ashfield Pond, Ashfield; Brown's Pond, Thorndike; Ashley Pond, Holyoke; Hampton Pond, Westfield-Southampton; Norwich Lake, Huntington; Walden Lake, Concord; Baddacook Pond, Groton; Lake Pearl, Wrentham; Ponkapoag Pond, Canton-Randolph; Morse's Pond, Wellesley; Snow's Pond, Rochester; Maquan Pond, Hanson; Jamaica Pond, Jamaica Plain; Silver Lake, Athol; Lashaway Lake, East Brookfield; Spectacle Pond, Lancaster.

A good deal of time was spent in classifying and grading the bass ponds to put this plan into operation. The product of the Palmer Hatchery plus a small number salvaged comprised the stock for planting.

*Blue Gill.* — The Stockwell Ponds furnished the blue gill stock for distribution. (See "Field Propagation.")

*Horned Pout.* — The stock for distribution comprised the fingerlings raised from brood stock in ponds at the Palmer Hatchery, fish from the Stockwell Ponds, and the product of miscellaneous salvage jobs.

Toward the close of the year a supply of fingerling and adult horned pout was secured from the Carter Pond Company (in exchange for 4,000 brook trout fingerlings from the Amherst Station) and placed in ponds at the Palmer Hatchery for spring distribution.

*Pickerel and Yellow Perch.* — The pickerel and yellow perch distributed were taken from Stockwell Ponds, together with a few adults from the Palmer Hatchery exhibited at the Eastern States Exposition and afterwards distributed.

*Alewife.* — In the work of restoring depleted alewife fisheries spawning adult alewives were planted as follows: Ipswich River, Ipswich, 1,750; Monponsett Lake, Halifax, 1,896; Lake Nippenicket, Bridgewater, 1,509; Carver Cotton Gin Company Pond, Bridgewater, 129.

### *Fish Distribution to Public Waters, 1925*

	Product of State Hatcheries	Not Hatchery Product (Sein- ing, Gift, Pur- chase, etc.)
Brook Trout:		
Eggs . . . . .	— <sup>1</sup>	—
Fingerlings . . . . .	1,278,725	—
Yearlings and adults . . . . .	35,596	—
Brown Trout and Loch Leven Trout:		
Fingerlings . . . . .	305	—
Yearlings and adults . . . . .	15	—
Small-mouth Black Bass:		
Fry . . . . .	96,000	—
Fingerlings . . . . .	55,700	—
Yearlings and adults . . . . .	89	36
Horned Pout:		
Fingerlings . . . . .	82,000	18,550
Adults . . . . .	45	1,492

<sup>1</sup> 50,000 eyed eggs planted in brooks.



*Fish Distribution to Public Waters, 1925 — Concluded*

	Product of State Hatcheries	Not Hatchery Product (Sein- ing, Gift, Pur- chase, etc.)
Chinook Salmon:		
Fingerlings	61,000	—
Yellow Perch:		
Fingerlings	13,025	—
Adults	75	111
White Perch:		
Adults	—	131,025
Blue Gills:		
Fingerlings	3,600	—
Adults	190	—
Pickarel:		
Adults	7,621	25
Alewives:		
Adults	—	5,284
Miscellaneous species:		
Wall-eyed pike perch adults	—	6
Rainbow trout adults	7	—
Large-mouth black bass adults	—	10
	<hr/> 1,633,993	<hr/> 156,539

*Trout Fingerlings (1 — 3-inch) Distributed to Clubs for rearing to larger Size before Liberation*

Ashfield Rod and Gun Club	8,000
Canton Fish and Game Protective Association	26,000
Dighton Fish and Game Club	10,900
Peabody Fish and Game Association	26,000
Springfield Fish and Game Association	15,000
Worcester County Fish and Game Association	86,800
	<hr/> 172,700

## GAME DISTRIBUTION

*Pheasants.* — The new Ayer Game Farm was in operation for the first time as an egg-producing farm. From it, persons interested in hatching and liberating pheasants to help along the work of stocking the covers, received eggs of the first quality. After egg-laying season the breeders were turned loose to produce a brood in the open.

A new policy has been inaugurated in the distribution of pheasants from the State game farms, which marks a distinct advance in the history of game production in Massachusetts. There is a strong demand on the part of the sportsmen for fewer partly-grown pheasants and for more adults, and unquestionably the best results come from the matured birds. To meet this demand plans have been laid for holding through the winter, for spring liberation, as much of the young stock as the stations can be made to accommodate. Lack of appropriation made it impossible to provide the required quarters this year; but from donations by the fish and game associations it has been possible to make a good beginning on the new plan in the way of construction work. Large yards have either been built or are now under construction at the farms, and with the exception of those birds the

clubs wish to winter, the majority of the birds of next year's hatch will be held at the farms and liberated as adult stock the following spring.

The fish and game associations (which in 1924 were asked to take the late-hatched birds and carry them over winter) were this year encouraged to do the same by the allotments of young birds sent them during the summer distribution. Several clubs have now permanent arrangements for this work, which is a valuable supplement to the work of the State game farms and holds possibilities of further development.

*White Hares.* — White hares were imported as usual from Maine for stocking the covers. Those purchased were obtained with considerable difficulty, for there was a scarcity of hares in the section from which they are trapped, due perhaps to the extremely open winter, or perhaps to disease. It is aimed to delay the liberation of these hares as much as possible until after the shooting season closes, so that they may have an opportunity to breed once before facing the hazards of an open season. This was accomplished to a greater degree than the previous year, 313 being liberated after our season closed.

*Miscellaneous Distribution.* — There were purchased 297 cottontail rabbits and 154 quail, distributed as follows: Watuppa Reservation, Fall River, 63 cottontails and 23 quail; Penikese Island, 79 cottontails and 59 quail; Marthas Vineyard, 69 cottontails and 22 quail; Nantucket, 61 cottontails and 20 quail; Mattapoisett, 25 cottontails; Worcester, 16 quail; Ipswich, 14 quail.

The cost of game distribution was \$1,590.59.

#### *Game Distribution to the Covers, 1925*

	Product of State Hatcheries	Not Hatchery Product (Purchase Gift, etc.)
Pheasants:		
Eggs . . . . .	- <sup>1</sup>	-
Young . . . . .	4,433	-
Adult . . . . .	2,039	-
Cottontail Rabbits:		
Adult . . . . .	-	297
White Hares:		
Adult . . . . .	-	1,062
Quail:		
Adult . . . . .	-	154
	6,472	1,513

<sup>1</sup> 12,333 pheasant eggs were distributed.

#### *Pheasants distributed to Clubs to be reared to Adults for Spring Liberation*

39 fish and game associations cared for . . . . .	2,385
4 individuals cared for . . . . .	76
Total pheasants wintered . . . . .	2,461

## MARINE FISHERIES

### INSPECTION OF FISH

That the people of the Commonwealth are eating more fish per capita than any other state in the Union, and also that the quality of fish as a whole brought to the dinner tables of the families of the old Bay State is of the highest, is evidence of the results attained by the work of this office as shown by the facts disclosed by

authentic reports. The quality statement also includes fish shipped from Massachusetts ports to consuming centers in other states. In other words, Massachusetts is making good not only in quantity but in quality fish production.

A survey of the daily reports of the work of this office shows that probably this year's landings of fish at Massachusetts ports are the largest of which there is any record. In addition to this, the receipts of fish for food distribution in Massachusetts from other countries and other states has been also very heavy. Ninety-five per cent of these totals, possibly aggregating between 200 and 250 million pounds, has come within the inspection scope of this office. It is pleasing to note the decrease in the amount of fish condemned as unfit for food, and this in the face of more numerous inspections than the previous year.

The office works in very close co-operation with the fish dealers, large and small. It is in daily touch with them. It knows their troubles. It is able to visualize them from the practical standpoint and therefore perhaps is in a position to accomplish more than if it held itself in a position apart from those with whom it has to do business. Co-operation is indeed mutual to a great extent and many problems and unfortunate situations are very expeditiously and properly solved without recourse to law.

In accord with its usual yearly program, inspection at producing points and in fish-selling cities and towns all over the State has been as frequent as possible with the force of one inspector and two deputies; indeed, more inspections were made this year than last.

There is some improvement in general conditions as far as the quality of fish is concerned in the retail stores throughout the State. The majority of the dealers are co-operating with this office and are freely adopting suggestions in regard to the care and handling of fish.

#### *Court Cases*

During the Lenten season this past year it was decided to conduct a campaign against dealers who have been considered negligent in the handling and marketing of their fish. In order to carry on this work deputies were obliged to jump from town to town and make inspections where it was thought necessary — that is, inspections were omitted in many stores that had a good reputation. During the seven weeks of Lent fifteen complaints were made against dealers found exposing fish at retail for food of a quality contrary to law, resulting in fifteen convictions. A similar campaign was made in the fall of the year, resulting in ten complaints and nine convictions, making a total of 25 complaints and 24 convictions. The Court has upheld us in our work, in many cases praising the work of our office and imposing a stiff sentence.

Speaking of cases brought to Court, the inspector this year, as last, takes occasion to publicly bring attention to the attitude of the judges. These officials, almost without exception, seem to quickly grasp the seriousness and importance of a "poor fish" case; view the matter with regard to the welfare of the public together with a consideration of the law that is a legal backing up of the work of this office. Indeed, in many cases which were met with sentence of conviction from the mouth of the presiding justices, there followed statements to the defendant so direct as to leave no doubt as to judicial opinion on the case in point and of any person guilty of selling fish unfit for food consumption to any one.

#### *Inspection at Producing Points*

The work of personal inspection of fisheries affairs at many producing ports of the State has been done as usual by the inspector, Provincetown, Chatham, Woods Hole, Wareham, New Bedford, Nantucket, and Marthas Vineyard, as well as Gloucester and Boston, being visited. At each of these points it seemed, speaking generally, that fares were landed with fair regard to freshness and quality.

The work of inspection at Gloucester for the season beginning May 1 and ending October 1 has as usual been undertaken by the inspector himself, this being made necessary owing to the small force with which this office has to work. The in-



spector was called to look over many million pounds more than the previous year. The condemnations of fish were less than the previous year.

### *Work Accomplished*

Inspections in retail stores, 2,107.

Inspections in wholesale stores, 18,300.

Freezer inspections, 328.

Inspections of peddlers' carts, about 300 weekly at Boston Fish Pier.

Inspections at Yarmouth, N. S. steamer, 108.

Vessel inspections at Gloucester, 204.

General inspection trips, 9.

Fish condemned at Boston Fish Pier from vessels, 20,103 pounds.

Fish condemned at Gloucester, direct from vessels, 214,000 pounds.

Fish condemned in retail stores, 3,245 pounds.

Condenned at Boston Fish Pier from the Yarmouth, N. S. steamer, 250 pounds shark, 610 pounds horse mackerel.

Condenned at Fish Pier from consignments on Yarmouth steamer: graded as "jellied," 22 swordfish — 5,662 pounds.

Condenned, landed at Boston from Canada by rail and steamer, 1,087 pounds smelts; 500 pounds pickerel.

Condenned, landed at Boston Fish Pier: arrived by rail, 1,280 pounds flounders; 425 pounds pollock; 615 pounds bonita; 150 pounds mackerel; 1,190 pounds horned pout; 1,225 pounds sardine herring; 35 pounds butters.

Condenned, landed at Boston Fish Pier: graded as "jellied," 89 swordfish — 20,103 pounds.

Total amount condemned at Boston Fish Pier and at Boston from Canada by rail and steamer, 33,132 pounds.

Total inspections, 21,356.

Total fish condemned, 283,509 pounds.

Total court cases, 25.

Total convictions, 24.

### *Blackstone Street Fish Market*

It is heartening to observe the present condition of the Blackstone Street outdoor fish market in Boston which is carried on each Saturday afternoon and evening throughout the year. When this market first came under the ken of fish inspection, some six years ago, fourteen carts were operating and the quality of fisheries goods offered to the public for food was of the lowest imaginable quality. At this point this office made a stand, introduced strict inspection on every day and evening the market was opened, with the result that today less than one-half the carts are now operating that were there before the fish inspection law came into operation; also the quality of the goods has advanced to the point where today Blackstone Street, "the poor people's fish market," offers on the whole and on the average as good goods as the average market throughout the Commonwealth of Massachusetts. True it is that in some instances goods below the desired quality are found. In these cases the fish are quickly condemned and removed from the zone of human consumption. When it is realized that during the past year, with inspection every day and afternoon that the market was open, fish unfit for food were found but twice, the general improvement in quality can be easily visualized.

### *Work at Freezing Plants*

More time and attention has been given this year than for some previous to fish food goods going into the freezers. The goods generally put into freezers have been of a high quality. One or two cases have been reported to the office where goods taken in were not up to a high standard and the offender promptly notified. It is unfortunate that the office has not at its command sufficient deputies to cover and supervise all such cases as these.

*A Very Important Case*

Probably one of the most important cases with which this office has had to deal for the year centered about the arrival at the Boston Fish Pier on Sunday, June 28, of the Swedish Steamer Tampen, Captain F. R. Haruve, hailing from Allesund and bringing, consigned to Rowe & Sullivan by the Atlantic Coast Fisheries Company of New York City, a cargo of 83,381 pounds of fresh halibut which were caught off the coast of Iceland by a fleet of four steamers operated by a concern in Sweden. The Tampen, acting as a runner for this fleet, collected the catches of the four crafts and in accordance with a preconceived business plan brought the same to the Boston market for sale. The possibilities were great. Could it be shown that fish from this far-off country could be laid down in Boston and sold at a less price than the Class A stock landed by our own vessels from short trips, there was no question but what the local halibut market would have come in for a considerable disruption and change-over.

As it turned out, however, the length of time it took the steamer to arrive figured out fully as much as the time taken by one of our own halibuters to make a whole trip to Georges and other grounds, therefore it became a question of quality.

The steamer was, as far as could be ascertained, 19 days in making the passage, being obliged to stop and re-coal at a Nova Scotia port, and then after heading for New York being diverted back to Boston, there to offer the trip for sale. On Monday morning, June 29, the fare was sold to the New England Halibut Company and O'Hara Brothers Company for 16c per pound for whites; 10c per pound for grays and 8c per pound for large grays, and the discharge of the cargo was begun forthwith under the inspecting eye of this office. Some 10,000 pounds were all that were taken out the first day, and these fish as far as this office could judge were number one goods, but for reasons unknown to this office and over which it had no control, shortly after the 10,000 pound point was reached, no more were taken out for the day.

All this time naturally the fish were growing older, so that on June 30 when the discharge of cargo was again started at 10.30 A.M. to the same concerns but few cartloads were taken out when in the opinion of the deputy fish inspector it became necessary to call a halt in the proceedings and to decide after close examination of fish then swayed out and also in the hold, that they had dropped to what is known as number three classification, which means that under law they were fit only for salting, smoking or otherwise preserving, and not for sale as fresh food fish. According to this decision no more fish from the steamer were taken out for shipment as fresh food fish.

Later the taking out of the trip was resumed, the rest of the fare going over the road by motor trucks to Gloucester, there to be flitched and salted and smoked, for which purpose the fish were in good order. Naturally with the decision of the deputy, the price dropped in accordance with the quality of the goods, so that the fish that went for flitching sold at five cents per pound.

It is not too much to say that but for the supervision and inspection work of this office, the fare might have gone on the market as food fish and been followed possibly by other trips from the Iceland grounds until there might have been built up a regular halibut service from Iceland. Had this been so, figuring the time it takes to catch a fare in Iceland waters and the length of time it takes for a steamer to lay the cargo down here, fully five weeks in all at least, the people of Massachusetts might have been placed in the position of being served with an inferior grade of goods, while absolutely new fish, the catches of our own vessels, would have suffered a severe cut in price, and perhaps forced the local halibut fleet out of business. The above statement is made conservatively all the way through and the wisdom of the work of this office in the matter is left for the public to decide.

*Conclusion*

This office has recently been notified by one of the largest chain store companies operating in this State of its intention to sell fresh fish weekly at certain of its stores. It seems almost certain that this action will be duplicated by other chain



store factors. This being the case, it is easy to see the extra burden which will be placed upon the work of this office, for as is well known, the sales of fish through such an avenue as the chain store will result in a heavy increase of fish consumption. This gives this office an opportunity to stress the point which has so long been evident, namely, the need of a larger appropriation for salaries and expenses and more deputies.

#### COMMERCIAL FISHERIES CONFERENCE

It has long been the wish of this Division to bring about a closer relationship with the commercial fisheries interests. With this end in view a meeting was called June 12 at which were present some twenty men prominent in the fishing industry, e. g. captains of fishing fleets, packers and dealers on Boston Fish Pier, and the Deputy Commissioner of Fisheries for the Federal government. The various problems of landing, handling and distribution of deep-sea products were discussed. It was voted "That the State of Massachusetts be represented on the Federal Commission for studying the Atlantic Coast Fisheries." On motion the meeting adjourned to secure a larger attendance at a later meeting which would discuss the problems of —

1. Stopping the use of pitchforks on fish.
2. Stopping the sale of white perch and striped bass.
3. Protection of trawlers against gill netters.
4. Close season on flounders in Nantucket County.
5. Better quality of fish needed.
6. Educate the public to use of fish and proper method of cooking.

The second conference on July 24 was attended by about fifty persons, including Professor Samuel C. Prescott of the Department of Biology and Public Health of the Massachusetts Institute of Technology; William S. Downs, Secretary of the Middle Atlantic Fisheries Association, New York City; legislative representatives from several districts; in addition to fishermen, packers and dealers. After an extended discussion the meeting closed, voting that "It is the sense of this meeting that the State inspection of fish be extended to the salt and pickled fish industry."

#### THE DEEP SEA FISHERIES

It is pleasing to be able to state that the marine fisheries of Massachusetts for the year 1925, for the fishermen themselves, and the dealer and the shipper as well, can without question be certified as "successful," thus showing that the industry as a whole is not only on the upward trend, but has arrived at a point where it is almost safe to say, with all due deference to the good old days of the past, it is doubtful if the fishing industry of the State as a whole was ever on a better or more successful business operating plane. The volume of fish landed and the accruing value thereof during 1925 was really unusual, and it is doubtful if the equal amount of catch and value received has been shown in any one year of the past history of the fisheries of this State. The catch was probably larger than any year since statistics have been kept.

The mackerel season provided a record-breaking epoch in the history of this fishery; many new crafts were added to the fishing fleet; few branches of fishing showed a decrease from the preceding year; indeed, the whole fishing industry from the man who pulls the line to the firm that sells the fish was one of increased prosperity. True it is that the fresh halibut and swordfishing branches showed a slight falling off in catch. This of course is more noticeable because of the fact that these two species command the highest prices in the local market of any fish caught and landed by the Massachusetts fleet. Nevertheless the diminution of catch from both these fleets, while enough to cause some concern, is still not sufficient to warrant the assertion that these fisheries are "going down hill."

Two factors of vast importance enter into any review of the fishing field of 1925 that is, the canning and the filleting of fresh fish. The production of these two branches has met with popular favor by the fish-consuming public, so much so that even the increase of production is inadequate at times to meet the demand.



Another feature of the year is the marked increase in the fleet of so-called "baby" trawlers. These crafts, gasoline-engined, built for speed as well as for combating with rough weather, are equipped with an otter trawl. They drag over grounds contiguous to the Massachusetts coast and make their trips generally in one or two days. So large is this fleet that the Boston Fish Pier is able, under any ordinary conditions, to provide for its customers almost daily the most absolutely freshest of fish.

Sizing up the fish situation of Massachusetts as a whole, it can be said that the catch has seldom if ever been larger, the quality has never been better, trade has markedly increased in both the fresh, frozen, salted, smoked and pickled lines, the whole industry is on a better business basis, there is a better understanding between the dealers themselves and also between the dealers and the fish-consuming public. All in all, the year 1925 is one that will be long and pleasantly remembered by those in any way connected with the fisheries of Massachusetts.

In Massachusetts fisheries history since the landing of the Pilgrims, the mackerel fishery has always held a place of major importance. In 1883, 1884 and 1885 this fishery reached its apex, the catch in 1884 marking up the high total of 478,000 barrels salted. This figure, as compared with the present total of 204,000 barrels of fresh and 12,500 barrels salted, seems a poor comparison, but let us pause for a moment and look over the situation. In 1884, when this enormous total was made, the fleet comprised something like 500 sail. Part of the year was spent along the coasts of Massachusetts and Maine and in the Bay of Fundy and the other part in what was known in these days as "The Bay"; in other words, in the Gulf of St. Lawrence. For the season of 1925 it is figured that but some 91 crafts engaged in the mackerel fishery. Outside of a few weeks in southern waters and on the Cape Shore they confined the limit of their fishing operations to grounds contiguous to the coast of Massachusetts and there corralled this wonderful total. Therefore there is ground for the statement, made at the opening of this story, that never before have the fishing grounds contiguous to the Commonwealth of Massachusetts been visited by such a vast shoal of mackerel as deigned to honor it by their presence in 1925. This statement is verified by the reports of those most competent to judge, namely the captains of the mackerel fishing crafts. These men, schooled in the mackerel game and with years of experience, some of them having been masters for much over a quarter century, have no hesitation in saying that never in all their "goin' fishin'" have they seen such enormous and so many schools of mackerel as visited the waters contiguous to the Massachusetts coast during the season of 1925.

There are several things that come to mind in connection with a review of these fisheries for the State for 1925. It is admitted that both the swordfish and halibut fishery showed a falling off and have for the past three years. What is to be done about it? The solution is in the hands of those who fish.

Again, while in 1924 the lobster industry showed a very slight gain after the lamentable decrease of 1923, it is figured that this year the increase, if any, will be far from satisfactory; which brings again to the front and center the question of what are we to do about our lobster fishery? And again the answer is, that the solution is in the hands of those who fish.

### *Winter Haddocking Fleet*

This busy and daring fleet of vessels, operating from Nantucket shoals to the eastern banks, adds to its credit for the winter season of 1924-5 what is probably an acme of catch in the history of the fisheries industry of Massachusetts in this line. Also, by a peculiar twist in weather conditions, this great fleet also profited unusually well because of the fact that for the first three months, figuring from December 1, 1924, the catch was not larger than that of the preceding year, but by reason of long spells of extremely rough and stormy weather there were many days when prices ranged a maximum. With the advent of March and then up to May 1 it is safe to say that never has the Boston Fish Pier seen such an influx of fresh groundfish, practically all in prime condition, as greeted the dealers morning after morning.

### *Summer Fresh Fishing Fleet*

The vessels operating for groundfish to land at the Boston market for table consumption and at Gloucester to be split and salted numbered about the same as the year previous. The season in this fishery covers the period from May 1 to October 1, and the fishing grounds extend from the South Channel and Georges Bank to the Middle Ground, a well-known spot in the vicinity of Sable Island.

During this past season the fleet numbered about the same as in 1924, but it is gratifying to note that the catch exceeded that of the previous season by several millions of pounds.

At the outset of the season the State Inspector of Fish suggested to owners and captains of crafts which were to engage in this fishery, that it would be better for them and the fish business as a whole if some salt were taken along in order that the results of the first few sets of the trawls might be salted down, and thus prevent fish from coming to market in a condition which would not warrant the O. K. stamp of the dealers, the buyers, or the Inspector. It was also emphasized at this same time by the State Inspector of Fish that ice should be freely used and largely carried by these vessels. Speaking from the point of co-operation, it is pleasing to note that in most cases the captains of crafts "went through" with the suggestions as made by the Inspector with the result that on landing their fares, they had little or no trouble, while others found themselves at times in difficulties. It was necessary during the season to condemn something like 200,000 pounds of fish, and but for the taking of sufficient ice and a reserve quantity of salt the amount of fish condemned this year would have been much larger. As it was, the season proved a fairly profitable one for all concerned, and fish landed were generally in satisfactory condition.

### *Swordfishing Fleet*

This is the third year in succession in which this office is obliged, by reason of fact, to note a decline in the catch in this branch of the fisheries. Prices ranged high throughout the season. In consequence, some crafts profited well on good catches, but as a whole, facing the fishing fact of a third declining year, it would not be the part of good judgment to attempt to mark anything like "successful" against the season's total result.

The first arrival of the season at the Boston Fish Pier with swordfish was sch. Hazel Jackson, which landed 53 fish and received therefor 33 cents per pound. The landings at the Boston Fish Pier of swordfish for the season were 8,430 fish, as against 10,581 for the season of 1924. Shipments via steamer from Nova Scotia to Boston added 1,574 to the total as against 1,698 in 1924. At Edgartown 100 were brought in, while at New Bedford about 1,612 were landed as compared with 1,100 in 1924. Woods Hole showed a total of 600 fish as compared with 500 the previous year.

### *The Mackerel Fishery*

Viewed in the light of the present and past history of Massachusetts fisheries, it can be safely said that in 1925 at least one branch not only equalled but exceeded all past records. In other words, those who were wont to prate about the "good old days" and disparage with a sneer the present-time achievements, especially in the fishing line, must for once give way; for it is written indelibly into the records, that working with a very small fleet of crafts, indeed, a fleet that in the mid-summer reached the maximum of only 91 sail, there were landed 203,961 barrels of fresh mackerel and 12,442 barrels salted, this grand total practically by the Massachusetts fleet.

In ratio of vessels and men engaged to pounds landed, you may search the records since 1804 in vain for its equal, and to many minds the most important part of all is the fact that at least 75 per cent of this entire catch was made on fishing grounds contiguous to the circuitous coastline of Massachusetts itself. In other words, this great harvest of the sea was garnered in waters in close proximity to the Massachusetts coast.

## ERRATUM

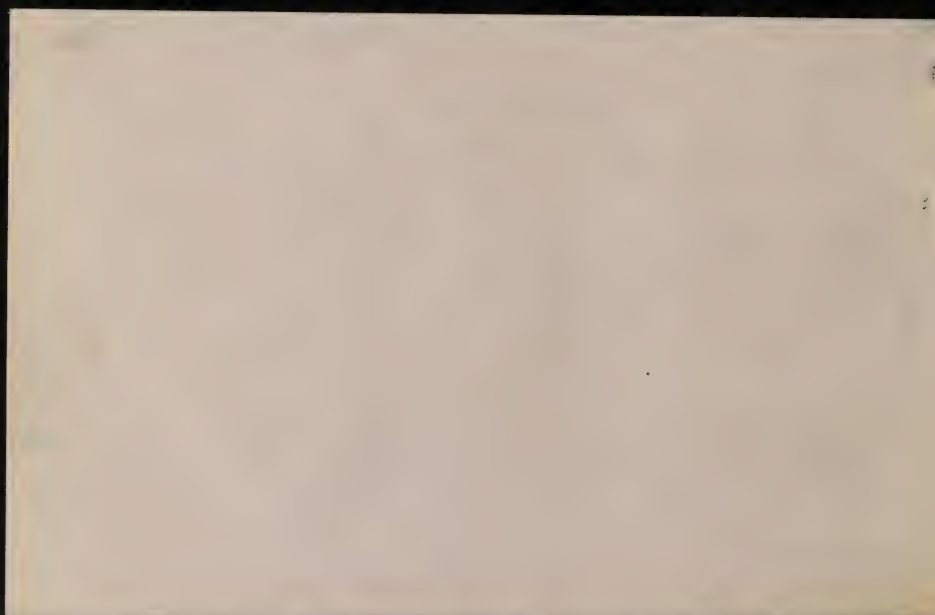
### Annual Report, Division of Fisheries and Game 1925

**Page 49.** The small salt and fresh mackerel table is incorrect, by reason of inversion of figures.

The table in correct form is as follows:

	Dec. 1, 1924 to Nov. 30, 1925	Dec., 1, 1923 to Nov. 30, 1924	Dec. 1, 1922 to Nov. 30, 1923
Salt Mackerel (bbls.)	12,442	11,000	3,864
Fresh Mackerel (bbls.)	<u>203,961</u>	<u>101,954</u>	<u>121,000</u>
	216,403	112,954	124,864





The first fares of mackerel were landed on Monday, April 13, at Cape May. These fish averaged about a pound each in weight, and were taken 35 miles south-east of Fenwick Island off the coast of Virginia. They were shipped rapidly to New York and Boston markets and on arrival sold at from 23c to 25c per pound. These first arrivals were quickly followed by others, and from then on the story of the southern mackerel fishery was one of marked success.

The seining fleet then headed for the "Cape Shore," otherwise the Nova Scotia coast, where the success in southern waters was duplicated. The first trip from the Cape Shore arrived in sch. Minna M., Captain Almon D. Mallock, at the Boston Fish Pier on Thursday, May 28, being twelve days earlier than the first arrival last year. The craft had 24,000 pounds of large and medium mackerel, the fare being sold at 13c per pound as against 8 and 8½ cents per pound for the first trip of the previous year. As far as known, this is the earliest record of a trip of mackerel ever arriving from the Cape Shore for market at a Massachusetts port.

Following the success of the crafts on the Cape Shore, the fleet, now being gradually increased because of the success attendant on this line of fishing, turned its attention with marked success to the fishing grounds from No Mans Land, eastward to the famous fishing ground off Nantucket Shoal Lightship and from there, in the northerly direction, over Nantucket Shoals, South Channel and Massachusetts Bay, including Middle Bank. About the middle of July mackerel began to show again in very large quantities and splendid hauls were made from South Channel and off the South Shoal Lightship. From then on until early Fall it was simply a story of the almost daily recurrence of fine catches.

On many days more mackerel were landed at the Boston Fish Pier than there were haddock and cod, and also quoted at less price. So many mackerel were brought in that it was necessary to divert some of the great influx to the wharves in Gloucester, where hundreds of men, armed with knives, split this overflow of fish fresh but a few hours out of the water and transformed them, by the use of salt, into the most splendid quality of salt mackerel that could be desired.

This in brief is the story of the most successful mackerel fishing season in the history of the fisheries when the bulk of the mackerel were taken directly off the Massachusetts coast practically for the whole season.

The Massachusetts catches of fresh and salted mackerel from December 1, 1924, to November 30, 1925, inclusive, and for the corresponding period of the two previous years, were as follows:

	Dec. 1, 1924 to Nov. 30, 1925	Dec. 1, 1923 to Nov. 30, 1924	Dec. 1, 1922 to Nov. 30, 1923
Salt mackerel (barrels)	203,961 12,442	11,000 101,954	3,864 121,000
	<hr/> 216,403	<hr/> 112,954	<hr/> 124,864

#### *Cape Shore Catches of Mackerel for Five Years*

Year	Arrivals	Fresh Mackerel (Pounds)	Salt Mackerel (Barrels)
1925 . . . . .	34	1,545,000	1,075
1924 . . . . .	24	996,000	854
1923 . . . . .	31	1,240,680	211
1922 . . . . .	48	1,353,900	2,344
1921 . . . . .	29	2,160,000	3,003

#### *Fresh Halibut Fleet*

It is a matter of regret and grave concern to note that the receipts of the fresh halibut fleet of the season 1925 have shown a drop from the preceding year, thus

making three years in succession in which this fleet has shown a decrease of catch yearly, following an upward tendency in five years or more.

The catch this year is 3,592,241 pounds as compared with 4,638,872 pounds in 1924, and 5,700,000 pounds in 1922, when evidently the peak of operations was reached, that is for the present era. With the exception of swordfish, halibut maintain the highest average price in Massachusetts markets of any Massachusetts-caught fish. Halibut caught on Atlantic fishing grounds from Georges to the Grand Bank are considered of finer quality than those caught in any other waters, hence the great demand for them; and it is safe to say here that taking it full and by, the demand exceeds the supply, and so has for the past few years.

### *Cape Cod Activities*

Bright as has been the report from all Cape Cod ports of the doings of their fishing crafts for the year, this good result has been considerably dimmed by the fact that the traps as a whole did not make satisfactory catches and, by reason of severe October gales, encountered damage to netting and poles which, for a conservative figure, will take at least from fifty to seventy-five thousand dollars to repair the damage. Besides this must be figured the amount of loss of catch at a very prolific season of the year when the traps were out of commission. The catches of the traps in a great measure regulate the stock in the Cape Cod freezers, so it is safe to say that the amount of frozen fish on hand in these receptacles for the winter trade is less than the previous year.

At Provincetown, as far as the boats, netters and seiners were concerned, it was one of the best. The mackerel netters operated with marked success, and landings were heavy from June 1 to the middle of July. Butterfish at the opening of the season were scarce and brought high prices. Whiting were abundant and the catch to the middle of July was ahead of the total of all last season when these fish struck in late. This year they came in early. A few porgies were taken, and these were of large size. The trap catch of mackerel, even from the opening of the season, was disappointing.

The traps at Provincetown and Truro took about 25 horse mackerel or bonito during the whole season, and an encouraging sign is that some small bluefish weighing from 2½ to 3 pounds were caught by some of the drag netters. At Provincetown during the last winter season the flounder boats operated to good advantage. As has been usual for the past few seasons, a sizable fleet operated on the offshore grounds where sea scallops were taken in goodly quantities.

The traps at Barnstable had a decidedly poor season. The total catch was not more than one-half that of the previous year, and practically no other food fish than mackerel were taken. Several fair catches of butterfish were made in the traps at Truro and Wellfleet during the season and also some good catches of butterfish were made by the seiners.

Chatham fared much better than most of her sister ports along the Cape as far as fishing success was concerned for the year, doing indeed better than the previous year, which was considered a good one. Squid struck in early and in very plentiful quantities along the shore and sold at good prices. Herring were plentiful and sold generally cheaply. Large mackerel were more plentiful than the previous year, especially for the gill netters. Small mackerel were scarce on this side of the Cape, but butterfish were present in far greater quantities than the previous year and brought fine prices. Scalloping was much better than last year, but the prices have ranged lower.

To the westward of Harwich the traps did well on squid, but mackerel and butterfish were not as plentiful as at Chatham. At Hyannis the mackerel netters' catch was very small, so much so that some of these netters abandoned the fishery off that port and came up to Chatham to fish their nets.

The fisheries at Hyannis were pursued as usual, the flounder fishing predominating until the ice came, then the fleet moved to Provincetown waters to resume operations. Quite a lot of mackerel were taken in the spring and the scallop fishery in the fall was better than for the past four years.



*Buzzards Bay*

The story of Buzzards Bay fishing this year is one, as far as the reports received at this office show, of increased catches of fish of several species. In the first place the traps did better than the year previous, the fish taken being mackerel, tautog, scup, herring, sea bass, whiting, hake, flounders, menhaden, squeteague and butterfish. A greater amount of mackerel than any other kind of edible fish were caught.

Handlining in the Bay this year could certainly be considered good, the fish taken being mostly scup, bass and tautog. The traps in the Sound, that is, just outside the Bay, were in operation from April 30 to October 10, while the traps in the Bay were catching fish from May 15 to September 1. It is considered by the fishermen that those traps set in the Sound did better than those in the Bay. It is very interesting to note here that quite a lot of bluefish were taken by handline in the Bay.

The New Bedford report is to the effect that during the spring and summer about 1,600 barrels of mackerel were landed there, possibly 75% of which were seined fish. A great bulk of these fish naturally came from outside Buzzards Bay. A total of 1,612 swordfish were landed and six or eight, which were jellied, were condemned. A considerable amount of flounders and some groundfish were landed by the flounder dragging fleet.

*Marthas Vineyard*

At Edgartown the season for the shore boats was the poorest for a number of years. Flounders were scarce except for the usual school of yellow tails on the fishing ground off Muskeget channel buoy. Mackerel through May and June were quite plentiful, but prices were so low that the fishermen realized but little. Few swordfish were taken within twenty miles of the land. About 100 were landed at Edgartown in all for the season. Bluefish and sea bass were very scarce. Scup also were not plenty, the catch being about three-fourths of the average of the last few years.

Alewives were more plentiful than for the last two years, the catch last spring going about 4,000 barrels as against about 3,000 barrels for each of the two preceding seasons.

The report to the westward of Edgartown, up to Menemsha and Gay Head, shows the spring codfishing about on the average with other years and a fairly good run of pollock during May. The traps in the Sound also had a better spring catch of scup than had been the case for many years, although these desirable fish did not run long. They were quite plentiful when they first struck in, bringing 10 to 12 cents per pound at the traps, which is indeed a very good price. Mackerel ran very plentifully with a correspondingly low price; so low in fact that some of the boats had to quit fishing as the price of 2 cents per pound was not very alluring.

Swordfish, inshore, were very scarce, practically all the fishing being done by the boats from 25 to 40 miles off. Otter trawling for summer flounders or "flukes" was better than common. The fall run of codfish was exceptionally good. With the opening of the fall and winter season this year, otter trawling for flounders has been fair and prices good.

*Nantucket Fisheries*

Nantucket has had a fairly successful fishing year. The winter of 1924-25 was very open and the otter trawl fishery for flounders was consequently very good up to March. During the winter prices were good but dropped in the spring. During April, May and June, the spawning months for these fish, catches were very large and the fares were "run through" to the New York market in excessive quantities, with the result that prices dropped to almost nothing and it was necessary for many of the boats to go outside and dump the major portion of their trips, a situation which is a sad commentary upon the fisheries and business judgment of those engaged in the fishery.

There were packed at this port for shipment, mostly to the New York market, from December 1, 1924, to November 30, 1925 — 20,725 barrels of fish, 200 pounds

net, the great bulk of the catch being flounders, and probably an equal amount, if not more, was "taken through" direct to the New York market by the fleet which makes Nantucket its fishing headquarters. This report includes flounders, cod and haddock and flukes. More flukes were taken this year than last, but prices ranged somewhat lower. Trap fishing this year was not very good. During the severe gales in October a great many scallops were washed ashore around the harbor, a lot of them seed, as well as many large ones.

The fishermen are talking a lot, as they have for the past two or three seasons, about giving up catching any flounders during the months of April and May on account of this being the spawning season, as well as the fact that at this time the New York market is so low that the bulk of the catches carried through and landed there have to be dumped overboard, while those sold bring such small prices that it is impossible to make a paying voyage. While nothing definite has been decided upon, it can be emphatically said that it is a shame that this practice should be allowed to continue, and it is to be hoped that the fishermen themselves will see to it that some action is taken looking to a close time during the spawning season.

### *Boston Fishing Activities*

It is the opinion of fish experts who are qualified to judge, that the fish landings from vessels at the Boston Fish Pier for the year ending November 30, 1925, were the largest in the history of the port, totalling nearly 152 million pounds.

The immense amount quoted above does not adequately express the amount of fish handled yearly in the Boston fish mart. Millions of pounds landed by small crafts of less than the United States enrollment limit of 5 tons can be added, and also more millions of pounds coming through from Nova Scotia and New Brunswick; from the far-off Pacific coast ports, Prince Rupert and Vancouver, and also from the many ports along our own coast from Eastport to Menemsha bight.

In the opinion of the Inspector of Fish, the following résumé, written as usual for this report by Frederick F. Dimick of the Boston Fish Bureau, tells the whole story in brief but incisive paragraphs. As Mr. Dimick is an authority of highest standing on these matters this office deems itself fortunate to receive, in advance of his own annual report, this fish story. Mr. Dimick says:

"Dealers have done a good business during the year 1925. There is much competition, and expenses of doing business are large and profits have been moderate. Although the catch of mackerel was 100 per cent larger than last year, many of these fish were turned over at little or no profit.

"The catch of groundfish shows a gratifying increase, and was one of the factors that contributed to the good business. The demand for fillets of haddock, which has been increased by the efforts of the dealers, has contributed to the activity of the fish trade. Haddock, which comprise about 50 per cent of the receipts of groundfish direct from the fishing fleet, are used mostly in making fillets.

"The receipts of swordfish, both foreign and domestic, were disappointing, owing to the light catch of these fish, and the high prices that prevailed throughout the season.

"The flounder business has expanded, and a number of new vessels have been added to this fishery. They are known as 'baby trawlers,' and fish from Nantucket to Cape Cod, and sometimes go to Georges Bank. They land a great variety of flat fish, and there is a growing demand for these fish.

"Halibut and salmon have been in good supply from the West Coast.

"Receipts from Cape Cod, which have in past years contributed a large supply of fish to this market, have been light.

"Owing to the good catch of mackerel and groundfish by the home fishermen the receipts of fish from Nova Scotia during the past year have been light.

"In a few instances some big stocks have been made by fishing vessels. Good stocks were made by many mackerel vessels, but those of the groundfish vessels have been about the average."



*Receipts of Fish at Boston Direct from the Fishing Fleet from December 1, 1924, to  
November 30, 1925*

	Pounds
Large Codfish . . . . .	26,687,139
Market Codfish . . . . .	9,887,809
Cod Scrod . . . . .	95,545
Haddock . . . . .	62,849,703
Scrod Haddock . . . . .	13,802,680
Hake . . . . .	1,593,445
Small Hake . . . . .	3,216,460
Pollock . . . . .	2,592,287
Cusk . . . . .	1,955,515
Halibut . . . . .	2,850,129
Mackerel . . . . .	18,369,203
Miscellaneous . . . . .	7,962,672
<b>Total . . . . .</b>	<b>151,861,587</b>

*The Gloucester Fisheries*

No better illustration of the come-back spirit, ingrained in the fisherman and fish dealer, can be exemplified than in the recent advance of the grand old fish port of Gloucester, which started fishing and in the fish business by authenticated record in 1623. The total landings figure of some 62 million pounds in 1923, following the heavy financial losses that the fish dealers stood for after the signing of the Armistice, rose to a 65 million total in 1924, and now this game old fish place is smirking with satisfaction on a figure total for 1925 of 80 million pounds.

Gloucester is going deep into the canned and prepared lines of fish food and is meeting with marked success. It is also an encouraging sign that the number of vessels going from the port is gradually increasing.

But one craft from this port this year engaged in the salt bank fishery, this craft going dory handlining. There were no line trawlers engaged in the salt bank fishery.

The Newfoundland herring fishery, which was for years pursued from this port to bays of the coast of Newfoundland by fleets of from 30 to 50 vessels each fall and winter season, and then practically went out of existence as a Massachusetts conducted fishery, has of late shown marked signs of rejuvenation and the demand for the smoked "bloomer" herring and frozen herring is noticeably increasing.

The following table gives the landings of fish at this port from December 1, 1924 to November 30, 1925:

	Pounds
Salt Cod . . . . .	3,829,358
Fresh Cod . . . . .	26,459,892
Halibut . . . . .	332,067
Haddock . . . . .	14,971,103
Hake . . . . .	1,471,320
Cusk . . . . .	968,580
Pollock . . . . .	2,457,847
Flitched Halibut . . . . .	—
Not product of American Fisheries . . . . .	10,602,077
Fresh Mackerel (Pounds) . . . . .	6,448,191
Salt Mackerel (Barrels) . . . . .	22,664
Fresh Herring (Pounds) . . . . .	1,269,000
Salt Herring (Barrels) . . . . .	8,140
Salt Bulk Herring (Barrels) . . . . .	12,242
Cured Fish (Quintals) . . . . .	23,179
Miscellaneous (Pounds) . . . . .	1,740,666

**Total December 1, 1924, to November 30, 1925 — 80,599,853 pounds.**



## SHORE FISHERIES

Summary of the reports of the shore net and pound fisheries as required by Sec. 148, Chapter 130, G. L.

Number of men engaged, 185; number of boats, 153; value of boats, \$37,631.00; number of fish pounds, 52; value of fish pounds, \$73,250.00; number of nets, 550; value of nets, \$10,005.00; catch in pounds: 6,733,437.

Alewives, 460,114  
Bluefish, 2,211  
Flounders, 105,981  
Mackerel, 1,695,455  
Menhaden, 44,659  
Pollock, 132,979  
Salmon, 62  
Scup, 94,171

Sea bass, 4,256  
Sea herring, 29,588  
Shad, 6,525  
Squeteague, 286  
Striped bass, 147  
Squid, 1,195,575  
Tautog, 28,926  
Other edible or bait species, 2,932,502.

Total pounds 6,733,437; total value \$155,482.46.

## THE LOBSTER FISHERY

Returns from questionnaires sent to the various wardens covering the shore line of the State would give indication that the catch of lobsters for 1925 would show an increase over the preceding season. Three of the 13 sections indicate a normal catch, while five report a catch above the average and five report a catch below the average. With but one exception all the districts reported the weather throughout the season as favorable, and there was little or no damage to fish gear.

The consensus of the thirteen reports is that unquestionably more "shorts," that is, lobsters below the legal length, were found by the lobstermen than during the previous season, while the various sections of the coast, as per the report, show a considerably divided opinion as to the presence of more or less seed lobsters. As to whether the crustaceans caught ran larger or smaller than usual, six of the divisions report them as running larger, while four reported them as running smaller, with three stating it to be of the average size. No particular points were brought out by the questionnaires beyond those above mentioned.

During the spring, from Nova Scotia shipments, there were seized at Boston, 14,282 short and 5 egg-bearing lobsters, all of which were distributed on favorable lobster locations along the whole State coast.

The totals of the tabulation of the returns of the year's fishing, required of the lobstermen by law, follow. The period covered is October 20, 1924, to October 20, 1925:

Number of men engaged in the fishery, 507; number of boats, 661; value of boats, \$175,589.00; number of pots used, 39,033; value of pots, \$103,898.00; number of lobsters taken, 1,048,811; pounds of lobsters, 1,573,207; value of lobsters, \$397,279.57; number of egg-bearing lobsters taken and returned to the waters, 12,655.

As required by Chapter 130, Section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1925 was 1,095.

## BOUNTIES ON SEALS

The following towns were reimbursed by the Commonwealth for bounties paid on seals under Chapter 130, General Laws, Section 155; Barnstable, \$2; Duxbury, \$88; Essex, \$14; Georgetown, \$2; Lynn, \$4; Nahant, \$2; Newburyport, \$4; Plymouth, \$8; Quincy, \$4; Revere, \$8; Yarmouth, \$84; fees to treasurers, \$55.

## MOLLUSK FISHERIES

The biological department, assisted by the wardens, made the usual annual survey of the mollusk fisheries, details of which are in the office files. Practically no change in conditions is shown since last year.

*Clam*

Statistics and information obtained from the clam diggers and those engaged in the industry reveal the fact that the production in all sections of the State, with the exception of possibly the North Shore, Nantucket and Barnstable, averaged fair, and in most sections it was extremely poor.

The lease of the clam flats of Newbury from the Commonwealth to the town, under Chapter 710, Acts of 1912, was renewed for ten years.

*Oyster*

Little that is new can be said of the oyster industry in the districts from which they are taken. A normal year was reported in a general way by those engaged in the business. The production and prices ranged about the same as in 1925. The town of Wareham is reported to have sold 22,000 bushels of one to three-year-old seed oysters during the year.

*Quahaug*

Data collected from quahaug diggers and persons engaged in the business commercially show a prosperous season in almost all sections in which quahaugs are dug. Prices in general remained about the same as last year, averaging from \$6 to \$12 per barrel wholesale, depending on the section from which they were taken.

*Scallop*

A prosperous year was reported from most of the towns in which scallops were taken, prices ranging from \$2.25 to \$4.50 per gallon.

*Contaminated Shellfish Areas*

The legislature of 1925 made provision, by Chapter 300, for a systematic examination of the shellfish areas of the State with respect to the fitness of shellfish taken therefrom for use as food. The act took effect at once, to remain in force only until June 1, 1926, but while in operation all acts inconsistent with its provisions are inoperative. It authorizes and directs the Department of Public Health to examine the tidal waters and flats, and samples of the shellfish therein, to mark contaminated areas, and to give publicity thereto. A penalty is provided for taking, transporting or possessing any shellfish whatever from such areas without written approval of the Commissioner of Public Health; the provisions of the act to be enforced by the wardens of this Division and all other officers authorized to make arrests. Between the passage of the act and the close of the year this Division was notified that the waters and flats of Newburyport Harbor, the Merrimack River and the estuaries tributary thereto are contaminated and the shellfish obtained therefrom are unfit for food and dangerous to public health. Examination of the rest of the shore is in progress.

*ALEWIFE*

Work for the welfare of the alewife fisheries was conducted in the usual way, namely, by pushing forward the work of opening all streams from headwaters to sea by installation of fishways where needed, and keeping in proper working order the existing ways, together with checking up the alewife runs in every stream in the spring (see Fishways); by stocking barren streams with spawning alewives; and by the usual annual survey of the industry from a commercial point of view.

This survey showed a decided increase in the catch in 1925 over that of 1924. This was true in the case of 17 streams out of the 51 concerning which statistics were obtained. In several streams where seining and fishing rights are usually sold, the selectmen voted not to sell them this year, and all the fish (except a few allowed the townspeople for home consumption) were allowed to run to the spawning beds. The sale of alewives caught during the run was obtained and recorded wherever possible. For most fisheries operated commercially, prices ranged from 50c to \$4 per barrel; in most cases considerably higher than in 1924.

In the work of transplanting alewives, two separate headwaters of the Taunton River system (one to the east and one to the west) were stocked during the spring run, making the fifth year of such plantings in this system.

In Monponsett Lakes, Halifax, were planted 115 alewives from the Old Gorman Mill Site, Pembroke, and 1,781 from Barker River, Pembroke.

In Lake Nippenicket, Bridgewater, were planted 1,509 alewives from the Taunton River, East Taunton.

In the pond above the Carver Cotton Gin Company, East Bridgewater, were planted 129 alewives from the Taunton River, East Taunton.

In the Ipswich River above the dam at Ipswich Mills were planted 1,750 alewives from Chebacco or Mill Brook, Essex.

Careful observations were made to ascertain whether any young alewives resulted from these plantings.

In the Ipswich River none were seen.

In Monponsett Lakes and in Lake Nippenicket young alewives in abundance were seen during the summer (particularly in the former), and even as late as September 16 they were noticed, some having reached four to six inches in length. At Lake Nippenicket the alewives transplanted did not school and spawn as quickly as did those in Monponsett, due to the fact that they were of a different run and probably unrelated.

On the Nemasket River, Middleboro, large numbers of young alewives were seen during the fall above the dam on Wareham Street.

In Red Brook (White Island Pond) large numbers of young alewives were seen returning downstream in the fall.

Respectfully submitted,

WILLIAM C. ADAMS, *Director*.



## APPENDIX

RECOMMENDATIONS TO BE CONTAINED IN THE SIXTIETH ANNUAL REPORT OF THE  
DIVISION OF FISHERIES AND GAME FOR THE YEAR 1925

The Director respectfully recommends the passage of laws designed to accomplish the following purposes:

1. *Relative to the Salary of the Director.* — Owing to the steady growth in the volume of business in this division it is the opinion of the Commissioner that the Director is not receiving a salary commensurate with his duties and responsibilities. The Commissioner, therefore, recommends that the salary be increased.

2. *Relative to Fishing in Inland Waters.* — Today no license is required to fish in ponds or streams not stocked subsequent to January 1, 1910. While the greater number of ponds and streams have been so stocked, the law requires the publication yearly of a list of stocked waters at the expense of considerable effort and money for their compilation and publication. If the Commonwealth has expended substantial sums to stock ponds prior to January 1, 1910, from which our fishermen are now receiving benefits, there is no logical reason for permitting these ponds to be fished without the purchase of a license. This requirement of law leads to considerable confusion and serves no practical purpose and should therefore be repealed.

3. *Relative to the Taking of Pickerel.* — The penalty for illegally taking pickerel is now fixed at one dollar whereas other species are protected by a minimum fine of ten dollars. As pickerel cannot be artificially propagated and must be maintained through the medium of protection it is essential that an adequate and uniform penalty be prescribed by means of which protection can be enforced.

4. *Relative to Fishing Tackle.* — At the present time a person is entitled to use ten traps for fishing through the ice. The principal fish taken in fishing through the ice is the pickerel. It begins to congregate on the breeding grounds early in the period when the ice forms, and remains in these localities until the spawning season, which starts about the time the ice leaves the ponds. These areas are well known to the fishermen and for that reason the ponds are more intensively fished during this period than at any other in the year. Our investigation shows that 90 per cent of the pickerel taken through the ice are female fish containing spawn. We are not able to artificially propagate the pickerel and must rely on natural reproduction to keep up the stock in our ponds. The reduction of the ice fisherman's gear by 50 per cent will be a partial correction of the great destruction of pickerel which takes place during the period that our ponds and streams are covered by ice. This contemplated change in the law will have little effect on the summer fisherman.

5. *Relative to Lobster Fishing.* — This act provides a penalty on the fisherman who dumps or destroys lobsters or receptacles containing them after he has been ordered by a warden to halt and display the lobsters in his possession. Wardens are seriously handicapped because of the fact that fishermen dump illegal lobsters when in danger of apprehension. In no other way can this practice be adequately stopped.

6. *Relative to Search and Seizure Under the Law Respecting Fish and Game.* — Under existing law no officer of the Division can obtain from any of our judges a warrant to search a dwelling house in order to obtain evidence of a violation of the fish and game laws. Short lobsters may be taken, and fish, birds, and quadrupeds illegally killed, and if they can be gotten into a dwelling house they are safe from pursuit and the violators cannot be apprehended with their quarry. Unless our officers can have the use of search warrants under such conditions, with suitable safeguards to prevent any unreasonable violations of the right of privacy,

it will continue to be extremely difficult, if not impossible, to stop many persistent violations of the fish and game laws.

7. *Relative to Lobster and Crab Fishing.* — At the present time no license is required to set traps for the purpose of catching crabs. Yet the traps used in this fishery will take lobsters, for the taking of which a license is required. Unless this law is extended to cover the taking of crabs it will be impossible to enforce the lobster license law as it should be enforced. This act will also impose a penalty upon any person who obtains a lobster fisherman's license by making false representations.

8. *To Reduce the Fee for a Sporting License Issued to Non-Residents of the State.* — It has become apparent that dissatisfaction has arisen over the fees charged to non-residents for both the straight sporting license and the special non-resident sporting licenses as they were established by the last General Court. The accompanying bill is submitted without any specific recommendation as to the proper fees to be charged for these classes of licenses in order that the matter may be opened for discussion and all parties given an opportunity to present their views.

9. *Relative to the Training of Hunting Dogs.* — Under the present law dogs cannot be trained on any protected species of birds or game between March 1 and September 1. This law does not prohibit the taking of fox hounds into the woods during this time or other dogs under the guise of hunting unprotected game. This serves to defeat the purposes of the law, i. e. to protect birds and game from disturbance during the breeding and nesting season and during the time when the young stock is practically helpless. Unless the wild life is free from all disturbance during this time the best results of conservation cannot be accomplished and for that reason it is recommended that the law be amended so as to prohibit the training or running of all dogs during the time above mentioned.

10. *To Amend the Law Relative to Deer.* — When the laws were recodified the phraseology used in the deer law was such as to create a doubt as to what its real intent was concerning the possession of deer in the close season. This recommendation is to clarify the law on this point and to establish a law which can be enforced.

11. *To Provide a Close Season on Ruffed Grouse in Dukes County.* — The decrease of ruffed grouse in this county has become apparent and the only way in which the decrease can be stopped and the birds restored in goodly numbers is through the medium of a close season of sufficient duration to re-establish them securely. That this can be done is demonstrated in the case of quail, which have become plentiful in this county as a result of a close season of several years with the result that an open season on quail in that county was possible this year.

12. *Relative to Hunting on State Reservations.* — A law was passed at the last session of the General Court allowing the Commissioner of Conservation to declare an open season on deer in state forest reservations but with the provision that authorization to hunt on such reservations should be by written permit. When the time came to declare such an open season it became immediately apparent that such a method was not practical and that all persons holding a sporting license should be allowed to hunt on such reservations if such an open season was declared. The purpose of this act is to eliminate the requirement of written permits for this form of hunting.

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The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1926

Mass. : DEPARTMENT OF CONSERVATION : Division of  
fisheries and game



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## The Commonwealth of Massachusetts

The Director of Fisheries and Game herewith presents the sixty-first annual report.

### GENERAL CONSIDERATIONS

In recent reports we have discussed, from one angle or another, the several principles upon which the protection and propagation of wild life are based in the different parts of the world. These run all the way from complete private ownership of game in some of the European countries, through to the public ownership theory that obtains in the United States.

In recent years the idea of game administration has taken a firm hold on our people, as distinguished from the old hit-or-miss policy of earlier years. Game administration, as the term implies, means the adoption of modern business methods in dealing with the propagation of game. The basic consideration is that of adequate financing of the things to be done. It is interesting to trace out what this represents, both under the theory of private ownership and that of public ownership. Under private ownership, operations are financed entirely by the owner of the land. He owns all of the game on his property and farms and administers it like any other crop. His income depends on the inventory of game that he can show to prospective renters of the shooting privilege immediately prior to the shooting season. It is to his personal interest to show the largest possible inventory, and as a result he does those things on his property which are best calculated to maintain the largest supply. Out of his own pocket he provides patrol against poaching, employs help to exterminate vermin, plants food and does the many necessary things to maintain proper conditions on such parts of his land as are primarily devoted to this purpose. In many instances he carries on a certain amount of artificial propagation. In other words, he invests some of his working capital in this enterprise, just as he buys fertilizer for his crops. His return on his investment comes through the leasing of the shooting and fishing privileges on his property. It is a business proposition from start to finish, and the sentimental side of it is enlarged upon and enjoyed by the man who buys up these privileges and enjoys the recreational sport of pursuit. All of this makes for an intensive development of the country, with a corresponding large production of at least certain species of game.

The picture in the United States, where we operate under the public ownership theory, is entirely different. Title to all the game lies in the people. Some years ago it was finally realized that the migratory species of game belongs to all the people of all the states; that it was in one state today and in another state a week later; that there were insuperable obstacles to any state trying to assume complete control of this game, because of its shifting status. Therefore its control was vested in the Federal government. The states, on the other hand, have complete



jurisdiction over the resident species of game found within their borders. The Federal and state governments, in their respective spheres, say when, where and how this game may be taken, and determine what property rights may be exercised over it when reduced to possession. The land owner has no more proprietary interest in it than has the floating population of our large cities and towns. As a result, he is no more interested in maintaining the supply than are other classes of our citizens. This is perfectly reasonable and should not be construed in any way as an indictment of the land-owning class. If the Federal government and the state governments insist on preserving this public ownership in the wild life, then they must of necessity assume the responsibilities of properly administering it. The agencies through which the wild life is administered by the Federal government and the several states are well known. Most of these agencies are operating along more or less similar lines, though local conditions may result in some variation in policy.

For the moment we are discussing those species of wild life which provide recreation as well as food for our people, as distinguished from certain other groups, such as the commercial fishes and the fur-bearing animals, which are largely economic. The work of the administrative agencies is financed in various ways in the several governments, ranging from appropriations made out of funds raised by general taxation, to the use of only those funds which are contributed by the fresh-water anglers and hunters. The sentiment seems to be growing throughout the country, as closer study is given to the cost of government operations, that the work carried on in the interest of the fresh-water fishermen and hunters should be largely, if not entirely, self-supporting, through a moderate charge in the shape of a license fee to cover the exploitation of these natural resources which are the property of all the people.

The proposition is reasonable if not carried too far. It is obvious that there are certain branches of Federal and State governmental activities which, from their very nature, can never be made revenue-producers, and hence will have to be financed entirely out of funds raised by general taxation. Others, such as the work in the interest of the sportsmen, can, through a license system, be made substantially self-supporting. Yet we should not lose sight of the fact that these sportsmen (and they are a representative group of our citizens, the term used in its broadest sense to include anglers as well as hunters) pay their proportionate share of the general taxes in addition to this special contribution in the shape of a license fee to support the work that is of special interest to them. This being the case, it is reasonable to expect that all of the funds paid in for licenses will be expended in administering the species of wild life in which this group is particularly interested, and that some additional sum out of the moneys raised by general taxation will be added to the license fees. The sportsmen the country over are coming to appreciate the reasonableness of the foregoing theory of financing the Federal and State administration of game and fish. They more fully understand today that the purchase of this license, which will entitle them to the enjoyment of a whole year's sport, subject to law, costs them less than would the privilege of enjoying one day's sport under the European system of the private ownership of game. For example, in our State this year the sportsman pays \$2.25 for a sporting license, which opens up to him the opportunity to pursue all species of game and fish. Under this license he has the potential opportunity to bag one deer, 91 upland game birds, 820 hares, rabbits and squirrels, 9,180 shore birds and water fowl, and upwards of 30,000 fish. The trapper, upon payment of \$2.25, may take unlimited quantities of all fur-bearing animals (except raccoons, of which the limit is 25) throughout a long open season. A single pelt from any of these animals would yield enough to reimburse him for the cost of this fee. Our sportsmen are beginning to realize the extraordinary privileges represented in the low-priced license. They understand more clearly than



ever before, that larger sums will have to be expended, year after year, in order to maintain an adequate supply of game; and that the complications of an enlarging civilization will make it increasingly difficult to preserve a sufficient stock to meet increasing demands.

## PERSONNEL

There were no changes in administrative personnel.

## FINANCES

	Appropriations	Expenditures	Balances	Corrected Balances (See footnotes)
<i>Maintenance</i>				
Salary of the Director	\$4,000	\$4,000.00	—	—
Services, office assistants	9,660	9,651.10	8.90	8.90
Office Expenses	8,000	7,430.45	569.55 <sup>a</sup>	69.55
Education and Publicity	1,000	497.48	502.52 <sup>b</sup>	2.52
Enforcement of Laws:				
Personal Services	60,500	58,838.07	1,661.93 <sup>c</sup>	361.93
Expenses	24,000	23,951.46	48.54	48.54
Coastal Warden Service	6,000	5,991.30	8.70	8.70
Biologists:				
Personal Services	4,700	4,643.18	56.82	56.82
Expenses	2,400	2,382.81	17.19	17.19
Propagation of Game Birds, Animals and Food Fish	86,000	88,239.89 <sup>d</sup>	(Overdraft) 2,239.89	60.11
Marine Fisheries:				
Personal Services	7,950 <sup>1</sup>	7,950.00	—	—
Expenses	2,200	2,155.27	44.73	44.73
<i>Special Construction</i>				
Improvements and additions at Fish Hatcheries and Game Farms	5,000	3,298.48	1,701.52	1,701.52 <sup>a</sup>
	\$221,410	\$219,029.49	—	\$2,380.51
Less amount available for use in 1927				1,701.52
Actually returned to Treasury				\$678.99

<sup>1</sup> The budget appropriation for Marine Fisheries, personal services, was increased by \$90 (from a special fund of the Commission on Administration and Finance) to cover salary increases.

<sup>2</sup> Toward the close of the fiscal year it was apparent that the appropriation for the Propagation of Game Birds, Animals and Food Fish of \$86,000 would be insufficient to cover all of the necessary expenditures to carry on the work included in this item of the budget. Out of this sub-division of the appropriations we must operate all the game farms and fish hatcheries, conduct the salvage of white perch and other fish, purchase outside stock, such as white hares, and pheasants for changing the blood lines in the brood stock, and many other items. In order to avoid curtailment of the year's work the situation was laid before His Excellency the Governor and the Council, and on September 15 an order was issued crediting the foregoing appropriation with \$2,300, being a transfer from the appropriation for Extraordinary Expenses, upon a guarantee from the Division that an equal amount would be returned unexpended from other divisions of our appropriations. This was done.

(Footnotes continued on next page.)

The revenue turned into the State Treasury was: for license fees (see details below), \$226,520.95; rent at Palmer Hatchery, \$144.00; sale of game tags, \$74.95; sale of launch hull, \$85.00; sale of gravel, \$10.50; lease of Chilmark Pond, \$75.00; lease of clam flats, \$65.00; permits to take shiners and suckers, \$180.00; sale of fancy pheasants, \$45.00; conscience fund, \$1.00; overpayment by city and town clerks, \$2.85; fines turned into the State Treasury from the county treasuries as a result of fish and game law violations, \$9,890.20; total, \$237,094.45.

### *Receipts in detail of Licenses*

(This table includes receipts, not only for the new forms of sporting licenses which went into effect Jan. 1, 1926, but also receipts for old forms of separate hunting, fishing and combination licenses which were in use during December, 1925. December, 1925 is the first month of the fiscal year 1926, which this report covers.)

Form of License	Total Number Issued	Gross Value	Fees to Clerks	Net Return to State
Received for forms of licenses issued prior to calendar year 1926	23,000	\$33,722.00	\$5,684.35	\$28,037.65
Resident Sporting	91,276	205,371.00	22,819.00	182,552.00
Resident Trapping	1,292	2,907.00	323.00	2,584.00
Non-resident Sporting	637	6,664.25	159.25	6,505.00
Non-resident Trapping	12	113.00	3.00	110.00
Alien Sporting	323	4,925.75	80.75	4,845.00
Alien Trapping	—	—	—	—
Minor Trapping	1,369	1,026.75	342.25	684.50
Duplicate Licenses	895	447.50	—	447.50
Lobster Licenses	898	898.00	134.70	763.30
	119,702	\$256,075.25	\$29,546.30	\$226,528.95
Deduct on account of previous overpayments		8.75	.75	8.00
Final net on all licenses	119,702	\$256,066.50	\$29,545.55	\$226,520.95

Inasmuch as the annual reports of past years have made no mention of the amounts turned into the Treasury in fines for violation of the

The following notes indicate how it was worked out:—

<sup>a</sup>\$500 was returned unexpended from Office Expenses;

<sup>b</sup>\$500 was returned unexpended from Education and Publicity;

<sup>c</sup>\$1300 was returned unexpended from Law Enforcement, Personal Services. This latter item was taken from Law Enforcement only when it was ascertained that salary increases for the wardens would not be granted sufficient to use up this amount, although the money had been appropriated.

<sup>a</sup> The appropriation for Improvements and Additions at Fish Hatcheries and Game Farms also covers the purchase of land. For some years we have carried a lease, with option of purchase, on one tract of land. The option expired on March 1, 1927. We did not believe that the lease and option could be renewed at the same price, owing to an increase in land values subsequent to the date of the lease. In order to make certain that the State did not lose the advantages under this lease, \$1,700 of the \$5,000 appropriation was held in reserve to cover the purchase price of this land. These appropriations for special purposes are available for two years.



fish and game laws, the following statement, covering the last twenty years, is of interest:

1905 . . . . .	\$1,897.60	1916 . . . . .	\$4,892.00
1906 . . . . .	1,678.83	1917 . . . . .	5,205.00
1907 . . . . .	2,555.65	1918 . . . . .	3,984.67
1908 . . . . .	3,970.81	1919 . . . . .	3,214.50
1909 . . . . .	4,397.77	1920 . . . . .	3,299.50
1910 . . . . .	3,711.13	1921 . . . . .	4,157.25
1911 . . . . .	2,584.06	1922 . . . . .	4,524.50
1912 . . . . .	3,935.43	1923 . . . . .	4,441.25
1913 . . . . .	5,460.75	1924 . . . . .	7,060.35
1914 . . . . .	5,412.50	1925 . . . . .	7,470.00
1915 . . . . .	5,010.50	1926 . . . . .	9,890.20

New sources of revenue are the five-dollar fee for the permits to use large nets for taking shiners and suckers for bait for commercial purposes (authorized by Chapter 195, Acts of 1926); the \$2.25 fee for the separate trapping license; and the fifty-cent fee for the replacement of lost sporting or trapping licenses.

This is the first year of operation under the sporting license, which went into effect on January 1, 1926. The fiscal year began on December 1, 1925, so that the moneys received during that month and January, 1926, represented sales of the old separate forms of hunting, fishing or combination licenses. The total cash receipts from sporting licenses of all forms for the fiscal year 1926 (including the trapping licenses) amounted to \$226,520.95. From the foregoing it will be seen that the actual cash paid in by the sportsmen more than paid all of the operating costs of this Division, although a substantial part of its activities were of no more benefit to the sportsmen than to the other classes of our citizens. In addition to the foregoing sum, \$9,890.20 was collected in fines resulting from the activities of the law-enforcement division, and \$683.30 in miscellaneous items. In other words, there was a total cash income of \$237,094.45 against a total appropriation of \$221,320.

The cost of the non-resident sporting license of \$15.25 was considered excessive, and it was reduced to \$5.25. Heretofore the non-resident fisherman could purchase a fishing license for \$2, while a non-resident hunter paid \$10. In view of the fact that the State is spending, each year, a larger sum on the maintenance of the stock of fish than on game; that the non-resident fisherman has a much longer open season in which to pursue his sport; and that all of his minor children under eighteen years may fish without charge,—it is reasonable that the non-resident fisherman should pay as much for this privilege as does the non-resident hunter.

In line with our contention that the proceeds from the sale of sporting licenses should be expended in the interest of those who pay for them, the divisional estimate of operating expenses for 1927 was presented in three parts. The plan and the reasons for it are fully set forth in a letter to the Budget Commissioner, dated November 29, 1926, as follows: Hon. Charles P. Howard,  
Commission on Administration and Finance,  
State House, Boston, Mass.

Dear Commissioner:

The budget for this Division was submitted to you in three parts, in order to emphasize what we consider to be the proper basis on which to finance the work.

In the division "*Administration, and the Propagation and Protection of Fresh Water Fisheries and Game*" we have grouped all the activities of direct benefit to the sportsmen (used in a collective sense) who buy



licenses. In addition to paying their proportionate share of taxes, these people also make a special contribution in the purchase of a sporting license for the operation of the Division in those matters of special benefit to the sportsmen. This being the case, we feel that annually a sum should be appropriated to carry on this work at least equal to the amount received from such licenses during the previous fiscal year. Such appropriation would maintain our inland warden force (as distinguished from the coastal warden force which has this last year been put on according to the provisions of Chapter 370, Acts of 1926). The law-enforcement service turns in annually a given sum through fines, and this amount should be added to the income from licenses.

During the year 1926 the income from licenses will amount to at least \$225,000. (We now have that much on hand with still several days to go.) We estimate, roughly, the income from fines at \$10,000, or a total cash income to the State of \$235,000.

In making up the budget for 1927 we earnestly urge that a sum equal to \$235,000 be set aside to operate those activities in this Division grouped in our budget under the above title. I could multiply the arguments to great length in favor of the proposition that this cash paid in by a group of our citizens (in addition to their share of the general taxes) should be expended wholly for their benefit.

Furthermore—the cost of doing these things is bound to increase as the years go by. The resources of the Division are taxed more and more each year in providing a reasonable amount of game and fish for this class to exploit in payment of the licenses purchased. There is also a great unfilled need of additional law enforcement, which will require some additional wardens and the complete motorization of the force, together with increased allowances for operating expenses. These demands will have to be met in one of two ways—by the State supplementing the cash received from licenses by additional amounts out of funds raised by general taxation, or by a gradual increase in the cost of sporting licenses.

I believe that it can be worked out for all practical purposes by a gradual increase in the cost of sporting licenses. But this result will have to come gradually. However, it could be materially advanced were the State to set aside a small amount out of the funds raised by general taxation, to be added to the annual sum realized from the sale of licenses in the preceding year. For example, for the year 1927 there should be an appropriation to carry on the work represented by the above title, of \$225,000, plus \$10,000, plus (for the sake of argument say ten per cent of the total cash paid in by the sportsmen) an additional sum out of the funds raised by general taxation of \$25,000, or a total appropriation of \$260,000. This action by the State in appropriating a little more than the sportsmen pay in in cash, will be, in my opinion, a good business proposition. It will show this group that the Commonwealth appreciates its splendid effort to finance the things which the State is doing for them. It should be a very great factor in bringing about an early and slight increase (say twenty-five cents) in the cost of the sporting license, which today is \$2.25.

It is hardly necessary to say that we are studying certain other possibilities for increasing the revenues, in order to take care of these increasing demands, while at the same time, year after year, making this sub-division of our work practically self-supporting.

Division of "*Non-game Bird Reservations and Wild Life Sanctuaries.*" The work of this group has to do with the protection and increase of the species of wild life that cannot be classed as game. These are the song and insectivorous birds, many varieties of our coastal birds, and the saving of one species now on the verge of extinction—the heath hen. While the rank and file of our sportsmen are interested in these forms of wild life, the principal appeal is made to that class of our citizens which is interested in the big outdoors but does not hunt or fish. We estimate

that at least one and a half million of our people are interested in our wild life from this angle. At the present time this class is not contributing one cent toward maintaining the work which the State is carrying on in behalf of the wild life in which they are deeply interested.

The cost of carrying on these activities (which are detailed in the budget) should be provided out of the funds raised by general taxation.

Division of "*Marine Fisheries*." Our work with the marine fisheries and the things that we should begin to do for this, one of our oldest industries, are outlined in the budget. Except to maintain the Division of Fish Inspection within this division, the State has spent very little in any year for the commercial fisheries. However, out of the appropriations for the Division, we have expended substantial amounts on certain salt water species which come into fresh water to breed. All of these items of expense have been, in the past, buried in the general appropriation for the Division.

For many years the Commonwealth, and rightly, has expended substantial sums annually in the furtherance of agriculture. This money has been provided out of the funds raised by general taxation. In view of the fact that the marine fisheries are equally concerned, with agriculture, in producing a valuable food supply at a reasonable cost, we feel that the work of the Division in the interest of the marine fisheries should be financed out of funds raised by general taxation. One of our wholesale houses has summed up the whole situation as follows—

"We call your attention to the fact that the fishermen and the farmers feed the world. The sea and the soil provide our daily food."

There is a real demand for the enlargement of our Division of Fish Inspection. Ample facts are available to show that it has been beneficial to the industry, itself, and of enormous benefit to the fish consuming public by reason of an improvement in the quality of fish now being distributed throughout our State as food. There are other items detailed in the budget which should now begin to receive attention."

Very truly yours,

WILLIAM C. ADAMS, *Director*.

There are certain fields in which the revenues may be increased before consideration is given to raising the present charge for the sporting license. The fines paid this year totalled \$9,890.20 on the basis of 943 convictions for violations of fish and game laws. A comparison of our statutory fines for such violations with fines established in other states for the same violations, shows that in Massachusetts the range is lower than it should be. Were it not for the fact that upon conviction for a violation of our laws the sporting license of the offender is revoked for one year, and he is barred from obtaining a license within one year from date of conviction if not possessing one at the time of conviction, there would be very little deterrent force in the amount of the fines now imposed for most classes of violations. A substantial increase in the schedule of fines would not only be an increasing deterrent factor in preventing violations of law, but would also be a source of additional revenue.

Today no license is required of those fishing for smelt in our coastal streams or bays. In view of the fact that in years past a substantial amount of the time of our wardens has been expended each spring in protecting the spawning beds of the smelt, and substantial sums have been expended in the collection and hatching of eggs and the distribution of spawn, it would be entirely reasonable to require all smelt fishermen to purchase a sporting license.

Study should be made of our present system of issuing the sporting licenses. Under present practices these are printed and are distributed to the city and town clerks through this Division. The clerks issue the licenses, and make a return monthly to this Division of all moneys collected



in the preceding month. Each clerk retains twenty-five cents from the price of each license (except for duplicate licenses) as a charge for issuing the same. During the past fiscal year it cost \$29,545.55 to issue 119,702 licenses. We believe that some way can be devised to do this with equal or greater convenience to the public, with equal security to the Commonwealth, and at a substantial saving in cost. We have under consideration the Oregon system, by which the licenses are issued through volunteer agencies—in the sporting goods stores, drug stores, and other agencies in the smaller centers. The State is protected by a blanket insurance policy, which automatically covers the agents appointed, from time to time. These agents receive no fees; it is purely a volunteer system. Except for a possible increase in the number of agencies, it does not appear that any different method of bookkeeping or system of distribution would be required from the present method of dealing with the city and town clerks.

Furthermore, we believe that by using such volunteer agencies, the principle of salesmanship could be injected into the plan and the purchase stimulated of a greater number of licenses than are issued today. We believe that hundreds, and possibly thousands, of our citizens who are interested in the out-doors, but who do not hunt or fish, would be willing to purchase licenses to help maintain this State division, which is the only agency that functions for the protection of all wild life, including the song and insectivorous birds and the birds of our coastal region. But in order to reach these people a more elastic system of handling the licenses is needed than exists today. In most cases the clerks receive no personal benefit from issuing these licenses, for in most cases, they receive a straight salary, and therefore the twenty-five cent fee goes into the municipal treasury. There is no incentive to increase the sale of licenses, as would be the case with agents who are primarily interested, either from a commercial or a sentimental point of view, in the activities of the Division.

#### CONFERENCES WITHIN THE STATE

The regular annual conference of sportsmen and those interested in wild life was held on January 13, at which the proposed new legislation was exhaustively discussed. These meetings are valuable as a clearing house for ideas and the abolishment of misapprehensions and misunderstandings.

On September 24, officers of this Division, upon invitation of the lobstermen of Marblehead, Beverly, Salem and Swampscott, with J. T. Adams of Marblehead acting as host, met in conference with representatives of the industry for the purpose of bringing about better cooperation between the latter and our law-enforcement officers. Various angles of the lobster problem were discussed, including the purchase of egg-bearing lobsters and the method of handling, the necessity of new laws or the revision of old ones, particularly size limits and methods of measuring, i. e., by ring entrance to the pot or by length. It was the sense of the meeting that conditions are better now than they have been for some years; they favored the present measure, but felt that the money provided by the licenses should be spent for more law-enforcement.

#### ACTIVITIES OUTSIDE THE STATE

The Director attended meetings having to do with activities directed to the consideration of fish and game matters, as follows:

Annual meeting of the American Breeders' Association of the American Game Protective and Propagation Association, Dec. 7-8, 1925, in New York City,—the one annual conference in the country that brings together the heads of the State departments and others interested in the artificial propagation of game, and at which, more than at any other gathering, such subjects are most discussed.



Annual meeting December 10, 1925, in Washington, D. C. of the Advisory Board to the U. S. Bureau of Biological Survey on the Migratory Bird Law, of which the Director is a member.

Second National Outdoor Recreation Conference Jan. 20-21, 1926, in Washington, D. C. The Director is a member of the General Council, and has served on committees of the organization from the time it was called into existence by the President of the United States in 1924.

In the interest of the Game Refuge Bill several trips were made to Washington, and one to Minneapolis (without charge to the State) for consultation with other members of the committee having the bill in charge.

For the first time in many years the Director failed in attendance at the annual gatherings of the fish and game officials of the country and of the American Fisheries Society (at Boise and Mobile), but several new projects recently set in motion required close attention at the time the meetings were in session.

#### ACKNOWLEDGMENTS

The law (Chapter 301, Acts of 1923) which permits the Commissioner of Conservation to receive gifts of land or personal property for the purpose of aiding in the propagation and protection of useful wild birds, quadrupeds or fish has been in effect several years, and as gifts have been received, mention has been made of them in the annual reports. In order to show a complete picture of what has taken place under that law from the time of its passage, a complete statement of such gifts is presented herewith:

Giver	Description of Gift	Use to be made of it
Ray Nye	Nye homestead and about 37 acres of land in Sandwich.	Permanent wild life sanctuary.
Dr. John C. Phillips	200* acres of land in Boxford; additional 3 acres.	"
Federation of the • Bird Clubs of New England	Carr Island (to be known as the Isaac Sprague Bird Sanctuary) in Merimack River off Newburyport, 110 acres. The several buildings on the island were taken down, and yielded a supply of valuable lumber, used in construction work at the fish hatcheries and game farms.	"
"	Ram Island, off Mattapoisett, 2 acres.	"
"	100 acres of land and virgin spruce on Mount Watatic in Ashburnham and Ashby.	"
"	Milk Island (to be known as the Knight Bird Refuge), 15 acres.	"
Four individual contributions of \$2 each	Cash—\$8.	Acquisition of permanent wild life sanctuaries.
Hon. Frank G. Allen	Cash—\$100.	Purchase of land in Sandwich (now held under lease) to be wild life sanctuary on which some propagation work may be carried on.
Dr. R. T. Fisher	Cash—\$10.	Construction of rearing pools at Montague Rearing Station.
The various Fish and Game Associations of the State. (Detailed statement follows).	Cash—\$4,608.21.	For increasing the rearing facilities at the fish hatcheries and game farms, so that trout may be reared to a size large enough to be caught when planted; and to carry pheasants to maturity before liberation.

\* Received under Section 69, Chapter 131, General Laws.

<i>Detail of the Contributions from the Fish and Game Associations</i>	
Agawam Sportsman's Club	\$100.00
Andover Fish and Game Club	50.00
Angle Tree Stone Rod and Gun Association—North Attleboro	100.00
Auburn Rod and Gun Club	25.00
Boston Fishing Club (For breeding brown trout at the Amherst Rearing Station)	200.00
Brampton Gun Club—Hopkinton	25.00
Canton Game Protective Association	65.00
Cape Ann Fish and Game Protective Association—Gloucester	121.00
Catamount Sportsman's Club—of Colrain	50.00
Charlemont Sportsmen's Association	16.50
Chester Rod and Gun Club	100.00
Clinton Fish and Game Protective Association	10.00
Dalton Rod and Gun Club	107.00
Dedham Hunting and Fishing Association	100.00
Fin, Fur and Feather Club—Wellesley	25.00
Fish and Game Club of New Bedford	50.00
Florence Fish and Game Association	25.00
Framingham Fish and Game Club	100.00
Franklin County League of Sportsmen's Clubs* (For construction at Montague Rearing Station)	455.71*
Granite City Rod and Gun Club—Quincy	50.00
Greenfield Rod and Gun Club	100.00
Hampshire County Sportsmen's Club	15.00
Haverhill Sportsmen's Club	100.00
Holyoke Fish and Game Association	50.00
Ipswich Fish and Game Protective Association	25.00
Lawrence Fish and Game Protective Association	100.00
Lee Sportsmen's Association	12.00
Leeds Rod and Gun Club	15.00
Legion Rod and Gun Club—Hardwick	50.00
Ludlow Fish and Game Association	75.00
Lynn Fish and Game Protective Association	50.00
Mansfield Fish and Game Protective Association	25.00
Martha's Vineyard Rod and Gun Club	20.00
Maynard Rod and Gun Club	100.00
Merrimack Valley Hunt Club—Lawrence	31.00
Middleboro Fish and Game Protective Association	50.00
New Bedford Rod and Gun Club	200.00
Nipmuc Rod and Gun Club—Mendon	100.00
North Adams Rod and Gun Club	50.00
North Adams Sportsmen's Club	30.00
Northampton Fish and Game Club	100.00
North End Rod and Gun Club of Taunton	25.00
North Shore Rod and Gun Club—Beverly	50.00
Northern Worcester Co. Fish and Game Club—Gardner	100.00
Norwottuck Fish and Game Association—Amherst	100.00
Paper City Rod and Gun Club—Holyoke (Construction at Amherst Rearing Station)	200.00
Paugus Rod and Gun Club—East Pepperell	50.00
Peabody Fish and Game Protective Association	100.00
Sandwich Rod and Gun Club	50.00
Silver Fox Rod and Gun Club—Enfield	50.00
South Seekonk Gun Club	35.00
Southern Worcester Co. Fish and Game Association	25.00
Springfield Fish and Game Association (For Palmer Hatchery or Wilbraham Game Farm)	300.00

\* This League also paid bills for labor amounting to \$144.29, making the total contribution \$600.



Sugar Loaf Sportsman's Club—South Deerfield . . . . .	100.00
Tanampo Club—Marstons Mills . . . . .	80.00
Walpole Sportsman's Association . . . . .	100.00
Westfield Rod and Gun Club, Inc. . . . .	150.00
Whitman Rod and Gun Club (Care and housing of pheasants) . . . . .	10.00
Williamsburg Rod and Gun Club . . . . .	10.00

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\$4,608.21

The following statement shows the amounts expended at each station in 1925 and 1926 from the club contributions, and the items of work accomplished.

*Amherst Rearing Station—\$1,006.59.*

Construction of 5 new cement dams to replace worn-out, temporary wooden dams, and the enlargement of existing pools for yearling fish.

A new cement dam across the foot of a series of existing pools, which permitted the enlargement of these pools and addition of others, resulting in one pool 60 x 12 x 3 ft.; two ponds 30 ft.; two ponds 45 ft.; six ponds 30 ft.

In addition, one pond was partly finished 200 x 12 x 3 ft.

Another section was partly dug out for two ponds which will be 100 ft. long each.

*Montague Rearing Station—\$1,250.90.*

Reconstruction of three concrete dams to replace temporary wooden dams, together with the reconstruction of a series of 3 large pools above the main dam, with an enlargement and deepening of the same, all for the purpose of carrying yearling trout; also in extending a tile line from a group of springs to feed these ponds.

Construction of concrete dam at the outlet of large pond below ice house on the back stream, accompanied by digging all of the pond a foot deeper for carrying yearling trout and brood stock.

Repairing the big dam and replacing much of the wood work. Most of the remaining stumps were removed.

In addition, deepening the pond above the dam to grow yearlings.

A section of the valley was cleared of underbrush and timber, in connection with a survey for larger ponds.

Construction of 4 ponds 100 x 12 x 3 feet, together with a roadway 18 ft. wide running parallel with these ponds.

Pipe lines were installed in order to carry water from the rest of the system to supply these pools.

*Palmer Fish Hatchery—\$235.50.*

A new pool, 165 x 8 ft. was built for carrying over fingerling trout to the yearling size. Temporary screens were put in the inlet and outlet in order to make use of the pool during the late summer and fall rearing season.

*Sandwich Fish Hatchery—\$484.03.*

Three large dirt pools (15 x 200 ft.) divided into six ponds by dam placed across the center of each, were constructed.

A part of the area between present hatchery grounds and the State road was cleared off in order to permit close inspection of the possibilities of this area for construction of additional ponds.

*Sutton Fish Hatchery—\$322.45.*

The old pheasant pens were repaired by re-setting concrete slabs that form the base and replacing rusted-out wire. Some of the pens were also resurfaced with a heavy filling of sand.

Some of the pools above the main pond were repaired, some enlarged, and the water deepened for the carrying of yearling trout.

Below the road the line of unused ponds extending to the lower part of the brook were cleaned out, sections of concrete slab re-set, three division dams of concrete put in, and some miscellaneous concreting done to refit these ponds for carrying yearlings.

*East Sandwich Bird Farm*—\$388.07.

Two large brailing yards were constructed for carrying over young birds to be liberated as adults in the spring.

Additional quarters were provided by converting six chicken houses into brooder houses, with new covered yards in front, making a continuous divided yard 120 x 30 ft.

*Marshfield Game Farm*—\$184.81.

Additional fencing was put up to connect the large brailing yard around the orchard with the yards adjoining the brooder houses on the hill, in order to make an additional enclosed field for the carrying of brailed birds.

The brailing yard in the orchard was sub-divided by additional fences.

Work was started on the construction of a large yard to take in all of the swamp and upland in front of the two brooder houses and the orchard.

*Wilbraham Game Farm*—\$469.87.

The framework was put up for a brailing yard 735 x 735 ft. and part of the wire purchased.

A wire-covered pen, 36 x 36 ft. was built to trap birds to be shipped. The frame work was painted.

*Miscellaneous*—\$145.01.

This amount was put out in freight and carting bills in the distribution, to the various stations, of the lumber salvaged on Carr Island.

The growth of public interest in the conservation of wild life has advanced so rapidly, and now extends to so many local and State activities represented by individual efforts and those of local and State organizations, that it is impossible to mention each single contribution.

An outstanding event was the formation of the "Associated Committees for Wild Life Conservation." This is a council composed of representatives of the Massachusetts Audubon Society, the Massachusetts Fish and Game Protective Association, and the Federation of the Bird Clubs of New England. While the Massachusetts Forestry Association is not officially a part of the council, it has indirect representation through its secretary, Mr. Harris A. Reynolds, who is a member of the Committee representing the Federation. This is the first time in the history of the State that representatives of the principal associations interested primarily in the protection of the song and insectivorous birds, and the sportsmen, have combined their efforts for the protection and increase of our wild life.

During the year a new league of sportsmen's organizations was formed, known as the "Massachusetts Associated Sportsmen, Inc." This League is made up of a substantial number of local fish and game clubs, representing the various parts of the State.

It is very heartening to report this increased activity of the rank and file of our people who are interested in one phase or another of wild life conservation. Thorough organization, under wise, conservative direction, is the surest guarantee of continuing advance in the right direction.

## ENFORCEMENT OF LAW

In accordance with the announced policy of the Division, renewed and vigorous efforts were made during the year to effect a more efficient and complete enforcement of the fish and game laws. The result is evidenced by an increase in the number of convictions, together with an increase in the revenues through the medium of court action. But the results of this policy are more clearly shown in the satisfaction expressed by the law-abiding sportsmen, who have come to realize the importance of apprehending and convicting violators of the laws if their sport is to be maintained at its highest in this Commonwealth.

In order to accomplish the best results, a change was made in the policy of administering the law enforcement work. Chief Warden Orrin C. Bourne was relieved of the routine of office work so that he could de-



vote his entire time to active field work. He will continue in the future, as he has done this year, to take active charge of the field operations, and will supervise any important law-enforcement activity as well as to conduct independent investigations.

The office and administrative work of the law enforcement section will, in the future, be in charge of Raymond J. Kenney, Deputy Chief Warden. He is assisted by Miss Irene V. Lydon, who has been transferred to the law-enforcement personnel from the general office staff, a promotion earned through two years' efficient work in her former position.

Several changes were made in the personnel of the law-enforcement unit by reason of death and retirements. Warden John F. Luman of Palmer died on August 16 after a brief illness. He was one of the oldest wardens in point of service, having been appointed in 1900. At one time he served as Chief Warden, which post he relinquished voluntarily. At all times he was rated as one of the most efficient men of the force, and was held in high esteem by the sportsmen and general public in his district. He was succeeded by Mr. Carl G. Bates of Westfield, who has established headquarters in Warren.

Warden William H. Leonard of Walpole was retired on January 6, having reached the maximum age of seventy years. He had served the department faithfully for seventeen years, and left behind him a commendable record of public service. He was succeeded by Warden Willis E. Chase of Mansfield.

Warden James P. Hatch was retired on June 1 because of physical disability, received in the line of duty, which incapacitated him for further work. Warden Hatch had an excellent record of twenty-one years of service which it will be difficult to equal. Herbert N. Battles of Westminister succeeded him as warden for the Springfield district.

Warden William H. Jones of Nantucket on July 1 tendered his resignation. Karl Eckert of Westfield succeeded him, establishing his headquarters on Martha's Vineyard. It will be the policy of the division to locate the warden for that district on Martha's Vineyard rather than Nantucket, for it is apparent that the best results can be accomplished through this arrangement.

Through the enactment of Chapter 370, Acts of 1926, the Division was authorized to establish a coastal warden service, designed primarily to enforce the regulations of the State Department of Public Health relative to the taking of shellfish from contaminated flats and waters. This situation has become serious from a public health standpoint. Five wardens were appointed under this law, Orin A. Arlin, Byfield, Ernest C. Cloon, Lynn, Daniel E. Ellis, North Easton, Don C. C. Lewis, Westport, and Fred Seaman, Fall River, dating from July 1, and they have been assigned to districts which in total cover the entire coast line of the State. As a secondary consideration these men will devote part of their time to the enforcement of the general laws relative to the marine fisheries as it is the present policy of the Division to separate the marine fisheries and the coastal enforcement from that handled by the regular force of wardens established for inland work. In the five months of their service these coastal wardens, in conjunction with the regular force, arrested 159 persons for taking shellfish from these restricted areas, after due notice to the public as to the necessity for the prohibition in order to safeguard the public health.

The new sporting license law, which eliminated the separate hunting and fishing license, together with the increased law enforcement, resulted in 306 persons being arrested and prosecuted for fishing in inland stocked waters without having secured a sporting license. This class of violation exceeds all others, and as there is no reason why the public should be permitted to deliberately violate the law requiring a sporting license to fish in stocked waters, the Division will continue to exert every effort to curb this practice. In this connection it is interesting to note that there



is no corresponding increase in the number of persons prosecuted for hunting without a license, which indicates that it is the fishermen who make light of the license law.

The court work for the year was as follows: Number of cases, 1,002; convicted, 943; discharged, 58; held for the Grand Jury, 1; (filed, 154, appealed, 78); fines imposed, \$12,961; costs paid, \$179.80. In the case of each conviction the person convicted loses any sporting or trapping license which may have been issued to him, together with his right to secure a license for a period of one year following the date of his conviction. Licenses revoked: resident citizen combination, 3; resident citizen hunting and trapping, 1; resident citizen sporting, 180; resident trapping, 13; alien sporting, 4; minor trapping, 1; resident lobsterman, 1; alien lobsterman, 1; total, 204.

The problem of the alien still continues to be of great importance in law enforcement work. Twenty-four persons were prosecuted during the year, charged with the illegal possession of firearms; all but four were convicted and substantial fines imposed and guns forfeited. One of the defendants received a direct jail sentence. Closely connected with the alien problem are the violations having to do with the killing of protected birds, particularly song birds. Nineteen such cases were prosecuted and \$210 collected in fines.

Twenty-two cases of killing protected shore birds were brought to the attention of the courts, which indicates that a number of hunters unacquainted with the numerous species of the protected shore birds, or who do not wish to become acquainted with them, persist in hunting during the shore bird season. While it is rather difficult to distinguish some of the protected birds, the matter was somewhat simplified this year by the prohibition under the Federal law of the killing of plover. Violations above referred to were actual breaches of the State laws, and did not include those persons apprehended for killing plover contrary to the Federal laws and who were prosecuted in the Federal courts.

The extremely pernicious practice of placing out poison for the killing of birds and animals appears now and then, and, despite the difficulty in securing sufficient evidence to convict under this law, two persons were apprehended and convicted, Wilho Mayranen of Westminster, fined \$300, and Owen Lewis of North Adams, sentenced to jail for three months. This is one of the worst forms of violation we have to deal with, and it is most reassuring to see that the courts will impose severe penalties whenever persons are apprehended for this offence.

While the number of persons prosecuted for fishing without a license greatly exceeds the number of those prosecuted for hunting without such a license, yet of the latter class 91 were brought before the lower courts. In almost every case when a conviction was secured a substantial fine was imposed, which serves notice on the public that the requirement of a sporting license to hunt and fish is an established policy in this State, and that the courts intend to maintain it by punishing severely all those who attempt to evade the law in that respect.

Numerous violations of the trapping laws were prosecuted this year. Under the new sporting license system a separate trapping license is required to follow this business, as it is now considered a commercial proposition rather than a sport. In the endeavor to put this industry on a business basis and build up and maintain it, every effort will be made to rule off the course the irresponsible and lawless trapper, so that this industry may be maintained for those who wish to follow it as a livelihood and who are willing to abide by the laws.

Among the fishermen the leading violations, outside of those concerning fishing without a sporting license, appeared to be the taking of horned pout during the closed season and the taking of undersized pickerel. Fifty-one persons who violated the pickerel laws were brought to justice. In practically every case of violation of these laws there is no

reasonable excuse for it. A fisherman who goes out before the season opens, intending to "beat the game," is a poor sportsman; and the man who goes fishing without providing himself with a suitable rule by which he can measure the fish, is taking an unnecessary chance. The fishing seasons are particularly long compared with the open seasons on game, and for that reason the man who fishes during the closed season is not entitled to sympathy. Some of our most popular pond fish, notably the pickerel, cannot be artificially propagated, and for that reason every effort is made to see that they are protected during the closed season, and that the law pertaining to the legal length and bag limit is respected.

Although the usual spring patrol was not maintained on the smelt brooks this year, occasional raids were made and eight violators apprehended, and fines totalling \$178 were assessed against them.

Despite the handicap in having no boat in which to conduct the work, 40 persons were prosecuted for violating the lobster laws. Eighteen of these were prosecuted for taking short lobsters and substantial fines, aggregating \$571, were assessed. The proper enforcement of the lobster laws presents a difficult problem, due to the absence of suitable boats for the work. The situation is also greatly aggravated by the disposition, on the part of an otherwise law-abiding public, to purchase and use illegal lobsters. So long as the demand for contraband lobsters exists, the matter will be a source of great difficulty, despite the fact that any intelligent fisherman should readily see that the taking of small lobsters will, in time, destroy the industry from which he derives his livelihood. But many of the lobster fishermen are foreign-born, and when respectable citizens eagerly assist them in breaking the short-lobster laws, it is very difficult to instill in them any respect for the laws.

As a whole, the warden force is handicapped because each warden is not equipped with a State-owned automobile with which to patrol his large territory. One-third of the men are still without such independent means of transportation. As the majority of the people who hunt and fish today, and particularly those who are bent on violating the laws, are motorized, the efficiency of the law-enforcement is necessarily below par.

Along with these handicaps is the fact that a great many people who witness violations or who know where such are committed, will not co-operate with the wardens in apprehending violators. Considering the large territory that each warden must cover, it can be readily seen that without a keen public interest and an earnest desire to see that violators are punished, the best results cannot be obtained.

Perhaps this need of an awakening on the part of the public can be best illustrated by mention of this significant fact. Under the law each city and town is empowered to request the appointment of a fish and game warden for that town, and only 75 have taken advantage of this provision. In this one respect the sportsmen throughout the State could render a special service to the cause if they would make certain that the local officials in their municipalities have an efficient and energetic warden holding office. The value of approximately 350 earnest and efficient men, supplementing the regular district wardens, is easy to estimate.

#### NEW LEGISLATION

The following changes, most of which are more fully discussed under the appropriate headings, were made in the fish and game laws during the 1926 session of the Legislature:

Chapter 19 increased the legal length and reduced the bag limit on trout for a certain portion of the Deerfield River, and authorized the Director to regulate the fisheries in the river.

Chapter 27 increased the penalty for taking illegal pickerel, from one to ten dollars per fish, giving the pickerel the same protection as is given other species.



Chapter 32 placed a five-year closed season on ruffed grouse in Dukes County.

Chapter 50 gave the selectmen of Chilmark additional authority in the matter of regulating fishing in the tidal waters of that town.

Chapter 66 amended the law relative to hunting deer on State reservations by eliminating the provision requiring a special written permit for such purposes. In the future, if a State reservation is opened to deer hunting by the Commissioner with the approval of the Governor and Council, all persons holding a sporting license will be entitled to hunt there.

Chapter 68 gave the cities and towns along the Taunton Great River the right to lease the alewife and shad fisheries in that river for terms or ten or more years.

Chapter 87 repealed an old law relative to the fisheries on Pasque Island, and again vested the control of the fisheries in the town of Gosnold.

Chapter 88 extended further the closed season on hares and rabbits in Dukes County.

Chapter 151 amended the present law to give the Director the right to authorize the taking of woodcock, ruffed grouse and quail for scientific purposes at any time of the year.

Chapter 181 amended the law relative to the killing of hares and rabbits found damaging farm crops, so as to give the farmer the same practical method of protecting his crops that he has for some time been accorded in the case of damage by pheasants or deer.

Chapter 195 authorized the Division to issue permits for the use of large nets for taking shiners and suckers for bait for commercial purposes. This will make available for the fresh-water fishermen, an increased supply of bait.

Chapter 352 amended the sporting license law as of January 1, 1927. It reduced to \$5.25 the present fee of \$15.25 now charged to non-residents of the State. The smaller fee is considered fair, in view of the fact that it has become a definite policy to maintain, in this State, the single sporting license principle. By the same law, non-residents who are entitled to present exceptions because of real estate holdings, will be entitled to a license for \$2.25 instead of the \$5.25 now charged. All minors under eighteen years of age, regardless of citizenship, are given the right to obtain a trapping license; a separate trapping license at \$2.25 is required of trappers, and there are other minor changes.

Chapter 370 gives the Department of Public Health additional authority in protecting the public health through restriction on the taking of shellfish from areas which are found to be contaminated.

## EDUCATION AND PUBLICITY

The educational and publicity work of the Division was conducted in a manner similar to other years. The number of illustrated lectures given was somewhat reduced, however, because, on account of more aggressive law enforcement work outlined in the previous section, the greater part of the Chief Warden's time was devoted to that activity. During the time of the year when the unfavorable conditions of the weather limited his field operations, however, he gave 20 lectures before schools, fish and game clubs, and other associations.

The policy of showing exhibits of live fish and game birds was abandoned, with the exception of the usual exhibit of live fish at the State Building at the Eastern States Exposition in Springfield, which lasts one week.

Considerable publicity work was carried on through the press, and a commendable co-operation was shown by the papers throughout the entire State. A particular effort was made to keep the public fully informed of the activities of the Division, and to bring to its attention



necessary information concerning the laws governing seasonal activities in hunting and fishing. In every instance, the press gave liberal space to the articles that we might succeed in arousing public interest in the work and in impressing the necessity for general co-operation in order to secure better enforcement of the fish and game laws.

## BIOLOGICAL DEPARTMENT

### FIELD WORK

The field work consisted of the installation of new fishways, periodical examinations of all alewife streams and fishways, the restocking of certain of these streams and headwaters with adult fish, and observations especially directed to the return of the young alewives from the spawning beds to the sea. The usual statistics were collected on the alewife and mollusk fisheries. All these activities are more fully described under their respective headings.

The development of wild life sanctuaries occupied a portion of the year. Considerable time was spent on the development of Penikese Island in particular, and a start, at least, was made in the extermination of rats on Milk Island, Rockport. Special attention was given to stocking other sanctuaries and reservations with game and fish, after investigation as to the proper cover and water. Upon request, visits were made to private estates to give advice as to their development into wild life sanctuaries; also on the construction and development of artificial ponds, and on general pond cultural work.

Prospective hatchery sites were viewed, and periodical visits made to the rearing stations of the several sportsmen's clubs which had undertaken the rearing of young pheasants to larger size, and advice given on the care of the birds.

Several cases were investigated of fish dying in ponds.

Any unusual or abnormal condition presenting itself among the fish or birds at the stations was investigated and treatment applied. On the whole, at all stations little or no trouble was experienced. There was no outbreak of any particular disease at any of the stations.

Specimens of fish and birds were received, as usual, for examination and autopsy, and the usual routine pathological examinations made.

Specimens of ruffed grouse for use in the study, begun last year, of the life history and diseases of this bird (see section on ruffed grouse) were received through the central office and forwarded to the investigators, while others were sent direct from the sportsmen throughout the State.

Considerable time was spent in photographing the various phases of our work, such as new fishways, wild life sanctuaries, and particularly the most recent construction work at the stations, thus bringing the photographic files up to date.

### DISTRIBUTION

The major activity of the biological department each year is the distribution of the stock produced at the fish hatcheries and game farms, and such as may be imported from outside the State. This necessitates periodical visits to the four game farms, five fish hatcheries, and the pond cultural unit, to see that the former are supplied with their quotas of adult stock from which eggs are collected for the year's operations, and that the latter are furnished with their quotas of eggs and fry to be hatched and reared. It includes, too, the supervision and inspection of this stock until the proper size is reached for liberation, its allotment to the various sections of the State, the planning of distribution details, and detailed office records. The work is described more fully under Fish and Game Distribution.

## WILD BIRDS AND ANIMALS

## WINTER FEEDING

Cold weather struck in just before Christmas, but it was an open winter except in early February, when several heavy storms piled up the snow and made feeding of the wild birds necessary. During the winter there was no heavy fall of snow on Cape Cod. Although the rest of the State had a few heavy storms, the snow was light and did comparatively little harm to bird life, and there were practically no ice storms. As usual grain was sent out in anticipation of emergencies, to the extent of 243 lots (4,810 pounds).

In addition to the agencies already interested in this work, the country clubs and golf clubs were asked to bear in mind the needs of the birds on and about their grounds. There is a growing activity in the care of life in the wild, and we are beginning to get a fine concentration on this work when emergencies arise.

## BREEDING SEASON

While the effect of weather conditions on the breeding of the game will be noted elsewhere, it may be stated in general that the spring was very cold and backward, resulting in a generally unfavorable breeding season.

## FIRES

There was no extraordinary drouth condition throughout the entire year. Through the early fall and up to and including the upland game season, sufficient rain fell to remove any necessity of closing the season because of the dryness of the covers.

## POSTED LAND

There has been no noticeable change in the amount of posted land. The conditions throughout the State are always "spotty." In one year there will be considerable posted land in a given locality. In time this tendency dies out, only to spring up again somewhere else. It is to the everlasting credit of the land owners of the Commonwealth that the anglers and hunters are given such a free range on our streams and in our covers. Each year we try to impress on the sporting fraternity the need of increasing respect for the property of others, in order to guarantee a continuance of this relationship.

## MIGRATORY BIRDS

*Song and Insectivorous Birds*

Permits were issued to 78 persons for the collection of birds, eggs and nests for scientific purposes. Sixty-nine reports were made, showing 214 birds and 301 eggs had been taken.

The song and insectivorous birds continue to engage our attention as closely as any other group of birds. The interest of the sportsmen in the preservation of these species is increasing year after year, and there is a better understanding all round between our people who are interested primarily in these species, and our sportsmen who, naturally, are especially interested in the game birds.

*Migratory Game Birds*

*Shore Birds.*—No one can speak with very great enthusiasm over the outlook for our shore birds. It is doubtful if they are any more than holding their own—considered as a group. There is a slight increase in the smaller species, and in perhaps one or two of the larger species.



On these now classed as game, and on which a hunting season is permitted, the situation is not at all satisfactory.

*Plover.*—Owing to the reduced numbers of golden plover it has been deemed advisable by the Federal government to declare an indefinite close season on this species. Reports of the black-breasted plover during the past year throughout the United States were so unfavorable that it was deemed advisable to close the season, for the time being, at least, on this species. An additional deciding factor was the similarity in the plumage of one stage of the golden and the black-breasted plover. The closing of the season on both species would more nearly guarantee complete protection to the golden plover.

During the summer and early fall migration, the golden plover appeared on our shores in more than usual numbers. It is very difficult to determine whether this was due to a real increase in the numbers, or to the fact that such plover as appeared lingered longer because undisturbed, and as a result bunched up in more impressive numbers.

The upland plover was not noted quite as extensively as usual.

There was no change in the status of the piping plover.

*Snipe.*—The spring migration was normal. The fall migration afforded less opportunity for sport than usual. It is difficult to account for this, unless the uniformly mild season caused the birds to drift along slowly and more evenly than usual. Our marshes were in better condition for the birds than is the case in an average year.

*Woodcock.*—There were heavy flights of woodcock through the spring, not confined to any particular locality, but quite general, and many remained to breed. Apparently the cold, late spring did not affect the woodcock to any great extent, for they are one of the first arrivals and seem to stand all sorts of changes and all varieties of weather.

On the fall flight the numbers appeared to be slightly under normal for the State as a whole. However, it is very difficult to make a comparison between the flight this fall and last, for the reason that last year between the middle and latter part of October there was a very cold spell all over New England, that seemed to push the woodcock along rapidly, with the result that they were somewhat bunched on their migration. This year the weather conditions have been more normal, with the result that the birds have drifted along in the usual fashion. For the foregoing reason, the general impression might prevail that there are less woodcock this year than last, but, taking everything into consideration, it is probable that they are holding their own, though with no appreciable increase.

*Rails.*—The rail is regarded with indifference as a game bird, and very few are killed. Several species were present in usual numbers.

*Sandpipers.*—The smaller species of shore birds appear to be slightly on the increase from year to year; but in view of the fact that complete protection is given to them throughout their entire range, it has been disappointing that they have not increased more rapidly.

*Winter and Summer Yellow-legs.*—While the spring flight was of good proportions, including both species, the late summer and fall migration was very disappointing. The general report from the migration region was to the effect that, general speaking, more black-breasted plover were seen than either summer or winter yellow-legs all through the migration period.

*Curlew.*—There were not quite so many reports of curlew, compared to the past two years.

*Ducks.*—The wood duck continues to thrive. While no substantial numbers can be reported, it is evident that these birds are slowly but surely increasing in numbers.

A few mallards are taken each year, but not enough to be any great factor in the volume of sport.

There was no unusual feature to the spring flight of red heads. Up



to the time of this report only a comparatively small volume of birds had come into our territory.

The same applies to the blue bill. It is difficult to account for this gradual lightening of the flight in the past two or three years.

The black duck continues to thrive. We believe it advisable each year to point out the fact that their numbers could be very substantially increased throughout the entire State were it possible to establish and develop wild life sanctuaries especially adapted for the breeding and the holding of them.

But few canvasbacks were noted during the fall migration.

*Geese*.—From December 1, 1925 through the remainder of the shooting season, the flight of geese increased over the earlier months. This seems to be an increasing annual phenomenon.

The spring flight was of about usual proportions.

The fall flight, up to the close of this report (November 30) was unusually light.

Throughout the entire country reports would indicate that the geese are more than holding their own. But, for some reason, the fall flight on our coast has lightened up during the past couple of years. Very interesting theories as to the cause of this have been advanced. Perhaps one that will bear closest following is—that the airplanes (particularly the mail planes) which are now covering clearly defined air lines day and night, have a tendency to push the birds farther out to sea. This is only another of those developments under the general term of "civilization" which, from time to time, combine to govern the annual life cycle of our wild stock.

The spring flight of brant was of ordinary proportions. Owing to the mild, early season the birds have been drifting along in about usual numbers up to the latter part of November.

*Statistics of the Gunning Stands*.—Number of stands operated, 80; geese shot, 2,147; ducks shot, 6,305; live goose decoys used, 3,286; wooden goose decoys used, 2,857; live duck decoys used, 2,589; wooden duck decoys used, 2,163.

#### *Migratory non-game Birds—Gulls and Terns*

No special work was done for the gulls and terns, except that the Federation of the Bird Clubs of New England is continuing its effort to acquire the most important natural breeding grounds along the coast. Some of these have already been presented to the Commonwealth, as set forth in previous reports, and others still remain the property of the Federation. The Federation also maintained a warden to guard the tern colony on the John B. Paine Bird Refuge at Chatham, a valuable breeding ground of the common, Arctic, least and roseate terns; employed a warden to post and guard the tern colony at Weepecket Islands; and contributed to the salary of a warden to do the same for the birds at Dry Shoal and Muskeget. (See also report on Penikese Island Reservation).

#### *Federal Control of Migratory Birds*

In the last report mention was made of the committee (representing the American Game Protective Association, the Izaak Walton League of America, the Western Association of State Game Commissioners, the National Audubon Societies, and the International Association of Game, Fish and Conservation Commissioners) which was preparing a new draft of the Game Refuge Bill, aimed to unite the sentiment of all sections of the country on the measure. The bill finally agreed upon, substituted for the federal license fee, a federal sales tax on sporting arms and ammunition. This method of raising funds did not, however, meet

the approval of the Administration at Washington, and when that became known, the committee filed a report to the effect that it was impossible to accomplish the object for which it was appointed, and disbanded.

Subsequently, at a meeting in Washington of representative conservationists from all parts of the country, the members of the above committee were asked to continue to serve as a committee in charge of the campaign for the passage of a Game Refuge Bill. A bill embracing most of the features of the original Game Refuge Bill, with some modifications intended to clarify the act as a whole, was introduced in the first session of the sixty-ninth Congress.

This bill was discussed at some length in the Senate, but action on it was postponed by dilatory tactics on the part of two or three Senators who were opposed to it, and thus a vote was prevented in the closing days of the session, although a poll of the Senate revealed that there was a sufficient number of Senators favorable to the bill to have enacted it had it come up for a vote. The bill was not brought up for a vote in the House—it being thought desirable for the Senate to pass on it before it was discussed in the other branch.

During the summer and fall the committee was engaged in considering further action in the interest of this legislation.

As time goes by and the American people continue to haggle over this question, the more apparent it becomes that the remedies proposed in this bill must be put into effect. It is useless to talk of preserving the many species of water fowl through restriction after restriction on the sportsmen, while standing idly by and permitting the breeding, feeding and wintering areas to be rapidly wiped out of existence.

We are familiar with the making over, in this State, of thousands of acres of such breeding and feeding areas into cranberry bogs; also the drainage of large swamp areas that were formerly the haunts of millions of these birds. The gunner never permanently removed those birds from our State. That was done by the encroachments of civilization. The shooting would have been only a passing phase had the breeding grounds been maintained—if only in part. The same thing has occurred in a great many other regions of the United States in localities even more favorable to those species. It is continuing with uninterrupted speed in other localities which, up to the present time, have been largely unmolested by man. Unless these conditions can be remedied by saving a portion of the breeding and feeding areas which are left, and restoring others, while at the same time making adequate provision to winter these birds on protected areas in the southern States, it is idle to talk of maintaining the wild life supply.

## UPLAND GAME

### *The Hunting Season*

From start to finish the hunting season may be characterized as normal. Sufficient rains removed any possible fire hazard. While the early part of the season was quite warm and there was more than the usual amount of rainfall, restricting somewhat the opportunities for sport, viewed as a whole it was satisfactory. The unusually steady, mild weather lightened up the woodcock flight and in general delayed the usual seasonal movements of the wild life as a whole.

*Pheasants.*—There is nothing unusual to record in connection with the pheasant. There was a plentiful supply of breeders and a good production. The pheasant is so firmly established and so hardy that, with an annual substantial stocking, they would continue to maintain their numbers reasonably well. The policy of bringing the greater proportion of the product of the game farms to maturity before liberation is well under way, and this year the proportion of immature stock lib-



erated is comparatively small. This end is accomplished either by retaining the birds at the State game farms, or arranging for clubs and individuals to carry them through the winter until spring. Though this plan entails more expense for feed, the matured product is many times more valuable than the young stock, and the project has the approval of the sportsmen. (See Game Distribution).

It is gratifying to note that there is little demand for an open season on hen pheasants. As the birds become more abundant this demand is likely to increase. On the other hand, the very existence of a good volume of sport depends on the presence of a large stock of hen pheasants in the covers, and we believe that any open season on hen pheasants for some years to come would be a very grave mistake. It is entirely possible that in a given year, because of unusual scarcity, the season might be closed on one or more other game birds, during which time, serious consideration would be given to opening the season on hen pheasants as a compensation to the sportsmen for the large sum which they are annually investing in the maintenance of sport. While it is a fact that the pheasant is artificially propagated and that the number liberated each year depends entirely on how much money can be invested in the project, nevertheless it takes a long period of time to firmly establish a good breeding stock of hen pheasants in the covers. This brood stock is the surest guarantee that in the years to come we will have increasing opportunities for sport.

The total number of pheasants reported shot in open season was 2,927, divided according to counties as follows: Barnstable, 13; Berkshire, 78; Bristol, 213; Essex, 447; Franklin, 92; Hampden, 274; Hampshire, 215; Middlesex, 505; Norfolk, 288; Plymouth, 284; Suffolk, 2; Worcester, 502; locality not reported, 14.

*Ruffed Grouse.*—The winter was not one which would impose any particular hardship on the grouse. There was a good-sized brood stock left over from the previous open season, and in the spring the covers (with local exceptions) were populated with at least an average number of grouse, and in many cases better than average. The breeding season was late, and the weather cold, though dry. There was an excellent production of young, and during the summer many flocks were seen, of small or average size through the eastern and central sections of the State, and large broods farther to the west. There was every reason to anticipate a good supply of birds for the fall shooting, but in late summer this condition suddenly changed, and where grouse had been seen commonly, a scarcity became apparent.

At the opening of the hunting season the weather was seasonable. The swamps and lowlands were pretty well dried out, but no fire menace existed, for there had been several rainstorms and snow lay on the ground in some parts of the State. There had been no heavy frosts, and the foliage still hung thick on the trees, making hunting difficult.

The grouse were very wild and difficult to approach, and widely scattered. The reports of the numbers of birds seen were conflicting. Some hunters reported them plentiful, but the majority inclined to the statement that very few were seen, and those mostly old or adult.

As the season went on, the most favorable reports on conditions came from Worcester county. At any time when the status of a species is under consideration we are bound to find "spotty" conditions. Even in 1919, when the season on grouse was closed for a year because of scarcity, the birds were reported in even more than normal numbers in some sections of the State. It may well be that the central part of the State is favored this year. It is a common experience to have the birds reported as scarce and widely scattered through the earlier part of a season, and then, toward the close, to receive reports that they are showing up in substantial numbers in the very localities where earlier scarcity existed. The grouse is a hardy bird and does not hesitate to



travel substantial distances for food. While it feeds on a variety of things, nevertheless it is partial to certain foods and will travel long distances to obtain them. In the early part of the season there is usually a generous food supply, widely scattered, and as a result, the birds are also thinly distributed. As the season advances and the food supplies are consumed (not only by partridges but by other birds) or decay, and as the cold weather makes large stretches of the country less attractive, the birds localize in favorable places.

While the later reports indicate a larger number of grouse than seemed to exist at the opening of the season, nevertheless the smallness of the stock, taking the State as a whole, is sufficient to cause concern.

This season marks the beginning of the five-year closed season on grouse in Dukes County, provided by Chapter 32, Acts of 1926, which was enacted on request of the local sportsmen. In view of this evidence of interest in their report, the Division made an effort to purchase grouse for liberation so that the increase of the birds might be hastened. Though inquiries were made even in the Canadian Provinces, no source of supply could be located. Arrangements were made with several trappers in western Massachusetts to collect a few specimens in their localities, but for one reason or another none were obtained.

Concerning the progress of the study of the ruffed grouse, mentioned in the last annual report, Dr. A. O. Gross writes:

"The special study of the ruffed grouse in New England, which is a part of the general investigation covering the entire range of the bird in the United States and Canada, is being continued under the direction of Dr. Alfred O. Gross, Bowdoin College, Brunswick, Me. Dr. E. E. Tyzzer of the Harvard Medical School has charge of, and is directly responsible for, the diagnoses of diseases and determination of the parasites. The sportsmen are taking an increased interest in this work, due largely to the activities of the Massachusetts Fish and Game Protective Association and the New England Grouse Investigation Committee under the chairmanship of Dr. John C. Phillips.

"Since the investigation began, over a thousand specimens of ruffed grouse have been received at the Bowdoin laboratory for examination. Sufficient material has now been examined to enable the investigators to determine the relative importance of the various diseases and parasites in the different sections of New England. The examination of material received this year has not been completed, but there seems to be a decline in the number of diseased birds, and the peak of destructiveness of these diseases apparently has been passed for this period. A report of progress, published in June, 1926, outlines the work done up to that time.

"Not only disease, but every factor which in any way affects the life of the ruffed grouse, is being carefully considered. The detailed determinations of the food of the thousand specimens is being done by the United States Biological Survey. Life history studies are conducted in the field at Brunswick, Me., where the various environmental factors in relation to the birds, especially the young, are given attention. Several weeks were spent in northern Maine, a part of New England which was reported to be seriously depleted in numbers. Sixty percent of the birds collected in that region were heavily infested with ticks. The large number of foxes and other predaceous animals were found to be an important factor in northern Maine. At the present time (winter of 1926-7) the great migration of goshawks and snowy owls is being studied, and the examination of several hundred specimens is expected to yield definite information concerning the effect of these predaceous birds on our game."

*Quail*.—In the quail country a large stock was left over from the gunning season, and they came through the winter with little diminution in numbers. The quail are now so carefully sought out and fed

by sportsmen and associations that the losses from severe winters has been partially guarded against. In the spring a noticeably large number of quail were heard calling. The season being late and the weather colder than average, some of the early hatches were light, but evidently the year's production was excellent, for at the opening of the gunning season quail were found to be more numerous than had been the case for many years. There was a noticeable and unusual number of very young birds, too small to shoot, apparently from late hatches.

On Martha's Vineyard the quail wintered most satisfactorily; not many had been shot in the previous season, and in the spring the island was well populated. Large broods of young were reported.

In seven of the fourteen counties there is now a complete close season on quail—Essex, Hampden, Hampshire, Middlesex, Nantucket, Norfolk and Worcester.

In Essex County the season has been closed since 1914, owing to the almost complete extermination there of quail. Limited stockings were made from time to time, with apparently no results. In recent years there have been reports of a few quail here and there, and this year there is reason to feel that they may again become established, for from ten or a dozen towns came well-authenticated reports of quail, not only small flocks but bevies numbering 10, 15 and 20 respectively.

It is especially pleasing to be able to report an increased number of covies in Worcester County and to the westward.

*Deer.*—In the deer season falling within the period of this report (December 7-12, 1925) the record was below that of 1924. In the latter year conditions were ideal from the standpoint of the hunter; but in 1925 conditions favored the deer, for the absence of snow made tracking difficult, the brush was dry and noisy, and the swamps were filled with water. On the whole it was good hunting weather, mostly clear, crisp and cold, though with a couple of days of high winds. Many hunters were afield, and, considering the circumstances, they had good success. The laws concerning the use of rifles and dogs were well observed. This was the first year of the two-year closed season on deer in Essex County, which was established on the request of the sportsmen of that county.

The Myles Standish State Forest Reservation, which had been a protected area so long that the deer had increased to such numbers as to cause serious damage to the nursery stock, was thrown open to deer hunters, and 34 deer were taken in the reservation.

The total number of deer shot in the State (including the above 34) was 1,340 (735 bucks and 605 does) divided by county as follows: Barnstable, 161; Berkshire, 339; Bristol, 46; Franklin, 180; Hampden, 171; Hampshire, 117; Middlesex, 8; Norfolk, 8; Plymouth, 159; Worcester, 151.

Good numbers of deer were left over from the open week, and survived the winter well, except that when the snow was deepest a number were run down and killed by dogs. This occurs yearly. Large numbers of fawns and young deer were seen through the spring and summer. Though they are unevenly distributed, the deer maintain their average numbers over the State as a whole, and in certain sections are increasing.

Deer shot while damaging crops numbered 90; and towns were reimbursed by the Commonwealth for claims paid for damage by deer to the amount of \$15,702.77.

*Squirrels.*—The beginning, noted last year, of an increase in the gray squirrel population, following the marked scarcity resulting from the dying of the chestnut trees in the State, has continued, and in most parts of the State squirrels are now present in far greater numbers than for many years. They have apparently adapted themselves to the changed conditions. The fact that they are not generally hunted as a



game animal, except by young hunters, has facilitated the restoration of the stock.

*Hares and Rabbits.*—The breeding season was favorable, with the result, based on a good carry-over of stock, that there were as many hares and cottontails in our covers as has been the case for many years.

One of the great difficulties in planting the hares which we import for general distribution, is the selection of suitable cover. Year after year we have liberated substantial numbers of white hares in the eastern portion of the State, with no result. The conviction is growing that most of the country east of the eastern boundary line of Worcester County is not suitable for white hares. There are a few exceptions, but, taken as a whole, this region would yield much better results if stocked annually with cottontails. The stocking that has been carried on in the natural white hare country has produced satisfactory results, and is an indication of what might be accomplished were funds available to purchase more of them each year. The cottontail is easier to produce. It has been found, by our experiments on Penikese Island, that if some sanctuaries, particularly suited to them, could be set aside, we could annually grow quite a stock for general release.

In initiating legislation to bring about a shortening of the rabbit and hare season in Dukes County (permitting their capture only from November 15 to February 15 instead of from October 20 to February 15), the sportsmen of that county have set an example which the rest of the State might profitably follow. There is no species of upland game in the United States which will stand as long an open season as the general law in Massachusetts permits on rabbits, and the sooner the sportsmen realize this, the sooner will there be a reasonable supply of these animals for sport. Following this restriction in the season the Division liberated a couple of hundred cottontail rabbits on Martha's Vineyard—63 on the Heath Hen Reservation and 154 on the open areas. Previous stockings have demonstrated that the cottontail is the only form of hare or rabbit suited to the island. With the conservative shooting proposed, and with annual stocking, this sport should be well maintained and increased.

In order to give proper protection to farmers and orchardists Chapter 181, Acts of 1926 was enacted, permitting the trapping or killing of hares or rabbits at any season if damaging trees or crops—written report to be made to the Director of this Division within twenty-four hours.

A disease having been reported among the cottontails in the western states, it was deemed advisable to inspect any shipments brought into this State. Therefore the public, and particularly the sportsmen's associations, were notified that, under existing law, a special permit must be obtained from the Division for the importation of such rabbits. These permits require the retention in quarantine of all cottontails for a period of ten days, within which period, we are advised by the Federal authorities, the disease would have run its course.

*Fur-bearing Animals.*—An amendment to the license law (Section 3, Chapter 352, Acts of 1926) requires licensed trappers to report their catch on forms furnished by this Division, between January 1 and 30 in each year, for the previous calendar year. This should make for more complete and uniform reports. The returns under the new arrangement show, for the calendar year 1926: Number of reports, 1,120; muskrat, 15,207; mink, 1,006; skunk, 4,697; red fox, 1,869; gray fox, 79; cross fox, 7; raccoon, 600; weasel, 477; otter, 22; total, 23,964.

The establishment of a special trapping license at \$2.25 by the above act has been previously noted.

There are points of view and opinions prevailing with the sportsmen on the one hand and the trappers on the other, which probably will never be completely reconciled. In common with regulation of the tak-



ing of other forms of wild life, there will always be arguments as to the proper open seasons. The amount of fur taken each year represents an economic return which should be maintained, and increased as far as possible, consistent with maintaining a suitable balance in our wild life. The price of desirable pelts is equivalent to putting a bounty on the heads of these animals, and from that angle we should be alert to watch the stock.

There is a pronounced sentiment in the State in favor of a year or two of close season on the muskrat, on the ground that this animal has never recovered from the excessive killing which took place several years ago when the skins were bringing an extraordinarily high price. In some quarters there is a feeling that the open season on raccoons, by which they may be taken with dog and gun (but not trapped) in the month of October, should be shortened up, so that the trapper and hunter start with equal opportunities. We mention these items as showing the necessity of very careful study of the fur-bearing animals in the years to come.

## ENEMIES TO GAME

### *Cats*

We continue to repeat the warning concerning the destruction of wild life each year by wild hunting house cats. The legislation on this subject proposed in past years has not been accepted seriously, but the conviction is growing that, unless some method is devised to restrict the large number of useless cats now to be found in the State, we will be rewarded by a diminishing game supply. We believe if this matter were taken hold of seriously by all parties interested, particularly the rural landowner, some method of control could be worked out that would not be prejudicial to the use of the cat for the control of rodents in and around buildings.

Last year (by Chapter 199, Acts of 1925, amending Section 90, Chapter 131, G. L., the bounty on wild cats, Canada lynx or loup-cervier was increased from \$5 to \$10. During 1926 the county treasurers paid out \$835 in bounties on 85 wild cats (3 at \$5 and 82 at \$10). These cats are on the increase, and are gradually extending their range. If these conditions continue another year, we should give serious consideration to further increasing the bounty in order that it would afford some incentive to the systematic trapping and hunting of them.

### *Hawks, Owls and Other Vermin*

There has been no invasion of the State by any of the northern hawks and owls for a number of years; but in early October goshawks began to make their appearance, and continued to come in increasing numbers. They were followed by the large Arctic owls, and by November both were more in evidence than for many years. No such numbers have been present, especially in such mild weather as was prevailing, within the memory of the hunters. Numbers of the birds were killed by sportsmen and others,—many being taken in the act of killing fowl, pheasants, partridges, ducks and other game, and many were brought to the taxidermists for mounting. Such a visitation only occurs when food scarcity or other conditions drive the birds down from their usual haunts.

## RESERVATIONS

### *Martha's Vineyard Reservation*

As usual the winter of 1925-6 was devoted primarily to the destruction of vermin. Patrol work on the reservation during the rabbit season kept off any hunters from the protected area.

Dr. A. O. Gross, under the auspices of the Federation of the Bird Clubs of New England, arrived at the reservation on March 27 for a census of the heath hen and a few days' study of the birds. With all the care exercised in searching for the heath hen the past winter by more people than in previous years, no more were discovered than for the same period last year. In the census by Dr. Gross, assisted by Superintendent Keniston, Mr. Arthur L. Clark and Warden Edward McLeod, fifteen heath hen were actually seen, and the estimate of the probable number on the island was set at thirty-five. The birds have probably held their own during the past year, and possibly a slight increase is shown.

In the spring, three acres of clover were seeded down, and the crop made good growth. On June 22 two long strips were planted, covering in all (with a later planting of buckwheat) about one thousand yards in length and about 15 feet wide. This was with the idea of attracting more heath hen to the reservation, where they would receive the direct attention of the superintendent. Green food and seed food was planted, namely, millet, peas, beans and beets. Unfortunately no heath hen visited this part of the reservation. Only quail and mourning doves have been observed on these planted strips. Superintendent Keniston is attempting, by every means, to bait the birds to this field, but as yet has not been successful.

The weather during the breeding period of the heath hen was average, except severe frost on June 21. No broods of young heath hen were seen by the superintendent, and he heard of only one brood which might have been heath hen chicks.

On November 20 the superintendent saw eleven heath hens on the farm of James Green in West Tisbury, where they had been feeding in the weeds in his garden plot through the season. These were the only heath hen seen by the superintendent during the fall, and none were seen on the reservation or on the Cromwell property since July.

The Federation of the Bird Clubs of New England continued to demonstrate its interest in the preservation of the heath hen by continuing to maintain a warden on the island for patrol and the extermination of vermin.

With the view of diverting the attention of some forms of vermin from the heath hen, 63 cottontail rabbits and 6 Belgian hares were liberated on the reservation. Should they increase, it will form a reservoir from which stock can be trapped for re-distribution in the event of a shortage of cottontails on the island in future.

There was only one fire during the year—on May 13. It burned over about  $5\frac{1}{2}$  square miles, but heath hen were not accustomed to collect on any part of this area.

The usual number of visitors called during the summer—62 signed the register and as many more left without signing.

Throughout the year the superintendent maintained a trap line from Menemsha to Edgartown and over the reservation, and the vermin taken by him for the year is as follows: 75 cats, 39 crows, 21 hawks, 82 rats (with many more killed with rat poison and gas). Stomachs of a large portion of the vermin were saved and shipped to Dr. Gross for examination. In every possible way we have co-operated with Dr. Gross in his studies. Trapping of vermin was also carried on throughout the year by Warden McLeod, who was employed by the Federation. From Dec. 1, 1925 to Nov. 30, 1926 (the period of this report) he destroyed: 45 cats (and 5 unborn kittens); 29 rats (and unknown numbers poisoned); 16 hawks; and 12 crows. He did no trapping in November.

In connection with the vermin problem, at the instance of the Heath Hen Committee of the Federation of the Bird Clubs of New England two agents of the Biological Survey at Washington, D. C. visited Martha's Vineyard and from November 7 to 16 carried on an investigation of the



rat situation on the island. Practically all parts of the island were visited, as well as the towns and many of the farms. The following extracts from the report indicate their findings:

"The important result of the investigation, from the standpoint of the extent of the rat infestation on the island, was the finding that the rats are not abundant as reported. Coming to the island, as we did, direct from a series of rat and field mouse control demonstrations in various places throughout Massachusetts and Rhode Island, it was strikingly evident that the rat infestation on the island was less than at places visited on the mainland.

However, the fact that rats were not found abundant in November was not assumed by the investigators to be proof that they were not unusually numerous the preceding June, and farmers and others were interviewed. The report continues,

"From all the data presented, however, it seems probable that rats as a whole were somewhat more abundant than usual during the summer, but that parasites or disease, or other natural causes, have reduced their numbers to below normal at the present time. This fluctuation in numbers is in common with all wild animal life, but is more pronounced in the more prolific species such as the house rat, rabbit and field mouse. This theory was strengthened by the amount of old rat working in evidence, in comparison with that showing fresh sign."

As to the claims advanced that our campaign of destruction of cats and hawks will result in the increase of rats, the report states:

"It is the writer's opinion that this will have little or no bearing on the rat population. It was found that the scrub oak plain where the stray cats are trapped is heavily infested with meadow mice and white-footed mice which have little economic importance. The cats probably subsist largely on these mice, and this undoubtedly accounts for the large number of cats ranging the area. It is unlikely, under the circumstances, that the cats would feed upon or kill many rats, even if present in large numbers, although it is highly conceivable that they would prove very destructive of ground nesting and ground feeding birds, particularly during the nesting season. It was found, however, that there are relatively few rats on the island far away from human habitation, wharves, dumps, etc., and that the cats trapped are for the most part, not those owned by residents or kept for the purpose of combating rats and mice around home premises, so that the destruction of cats roaming the plain could not well have much influence on the number of rats."

Concerning the rat problem in its relation to the propagation of the heath hen the report states:

"Due to the scarcity of the heath hen and the difficulty in locating the nests, the extent to which rats prey upon the eggs and young birds will possibly never be definitely known. Also on account of the little time available for study of the rat occurring on the scrub oak plains and its relative scarcity, it was not possible to determine its status there. That they are not numerous was evident, but that they do occur in most unlikely places throughout the plains, at least near the roads, has been proven by their having been taken in Mr. McLeod's and Mr. Keniston's traps at all seasons of the year. They are also occasionally run over by autos long distances from buildings or cultivated fields. It is quite possible, however, that these may have been traveling or migrating rats.

\* \* \*

"It is doubtful, however, that rats play any important role in the heath hen's struggle for existence. The areas in which the heath hen presumably nests are unsuited for house rats and it is unlikely that many of them come in contact with the birds during the nesting season. During our several inspections of the scrub oak plains surrounding the reservation (during which five heath hens were seen), no signs of rats were found, except, of course, at all occupied buildings."



In the course of the investigation certain farms were cleared of rats by the use of poison, much information disseminated among the residents of the island as to methods of vermin control, and a supply of poison was left with Warden McLeod for treating infested areas.

### *Penikese Island Sanctuary*

The development of Penikese Island as a sanctuary was continued, and the restoration of the island to its natural state, commenced in 1925, was carried forward as funds would permit. In December of 1925 the caretaker's house was painted inside and out, a plank walk laid to the shore house, and a heating system installed. One-half the cost of the latter was paid by the Federation of the Bird Clubs of New England. In November of 1926 the biologist and the caretaker burned all of the buildings on the west side of the island, formerly used by the lepers, as well as the barn buildings on the east side, and all other wooden outhouses except one or two used for farming equipment and grain storage. There still remain to be wrecked, the partly demolished concrete Administration Building and the concrete laundry building.

During January, February and March, flocks of ducks and geese, stopping on the island during migration, were fed grain daily, and the decoy ducks and geese were tethered out as a further attraction.

One of the objectives in developing Penikese Island is to make it a way-station for wild water fowl on migration. To this end we are developing a supply of fresh water and have grain available at the most attractive locations for such birds as may come to the island. A daily record is kept of the visitations, but this is too voluminous for publication. In the early part of December flocks of geese were observed flying low over the island and apparently interested in our decoys. A few flocks appeared off and on during the period from December 7 to April 22. At different times small families of geese alighted on the island, and in one instance (April 3) 63 geese spent the night on the west side.

The ducks (black duck) were somewhat less wary. For example, between January 1 and 6, two hundred were on the island constantly. On some occasions of heavy weather as many as 200 would come to the island. We believe, if we continue the systematic maintenance of decoys and feed, we will eventually be entertaining increasing numbers of geese and ducks on this sanctuary.

The 10 decoy geese raised 5 young, and the 8 call ducks 15, all of which were retained to follow the calling of their parents.

The terns arrived in somewhat scattered numbers, from April 26 to May 15, and remained until August 15. Practically no young were reared, due partly to the heavy storms and the extreme backward spring. The few birds hatched were probably killed by the very heavy rain and cold weather; and the very large number of rotten eggs was undoubtedly due to the extremely damp, cold weather during the period when the terns were on the island. The scarcity of small fish in this vicinity and the lateness of their arrival necessitated long trips by the parent terns for food, and may have resulted in neglect of both eggs and young.

Of the 59 quail liberated in 1925, only 3 females and one male remain at the close of this report.

The 79 cottontail rabbits liberated in 1925 have increased to hundreds, and it is planned to trap a portion in early 1927 for distribution on the mainland. Twenty-four, shipped to the Fall River Rod and Gun Club for a field trial, were later liberated. The white hares have gradually died off, and, as the island affords no proper cover, it is planned to remove them.

Considerable progress was made on the development into a pond of a large swamp area on the northerly point of the island. Work was begun by the caretaker by digging a trench 200 x 5 ft. and 4 ft. deep.

This trench will be continued, from time to time, and with the spring rains the ducks and geese themselves will do considerable to work this pond. The swamp is fenced with posts salvaged from the partly wrecked buildings, and new wire purchased for the purpose.

A piece of cultivated land was fenced in and planted to turnips, rutabaga, cabbage, beets and potatoes, for winter rabbit food, but the young rabbits got through the wire and ate most of the vegetables. A section adjoining the garden was also fenced off as a holding yard for hares and cottontails before shipping.

25 four-year old Scotch pine, 25 Norway spruce, and 50 5-year old Arborvitae, obtained from the Division of Forestry, were planted.

Attention was given to exterminating vermin, resulting in the destruction of thousands of garter snakes and a large number of crows and hawks, together with 6 great white owls.

### OTHER SANCTUARIES

There is no special report to be made on the other State-owned sanctuaries. Without active administration on our part, they serve as natural breeding grounds and refuges for the species to which, by their physical make-up, they are adapted. As time goes on it is anticipated that money will be available to do the things which need to be done to make them more suitable, but until then, any extensive development must remain in abeyance. Appropriations for such work have been asked in the 1927 budget.

The buildings on the Henry Cabot Lodge Bird Sanctuary (Egg Rock) should be removed, and, lacking divisional funds, an effort is being made to either interest the local bird club to raise the funds, or to locate some concern which would do the work for the salvage value of the material.

On the Knight Bird Refuge Sanctuary (Milk Island) a campaign was begun for the extermination of the rats and snakes which infest it, by the use of calcium cyanide—which, pumped into the holes, releases a deadly gas. The process will be repeated at intervals until the island is free from vermin.

On the Isaac Sprague Bird Sanctuary (Carr Island) the remaining buildings (except the residence) should be removed and a suitable dam built, in order to flow the pond. This latter development will permit of the making of a substantial fresh-water pond on a small island, located out in the salt water. It is apparent at once that this should be a splendid stopping place for many kinds of water fowl on the annual migrations. There is a splendid opportunity for enlarging the supply of food-bearing trees and shrubs to be an attraction to all kinds of song and insectivorous birds. The rabbits liberated on this sanctuary last year have already increased.

There is nothing of special note concerning Ram Island and Mount Watatic Sanctuaries.

### *Reservations under Sec. 69-75, Ch. 131, G. L.*

The term for which the Hingham Reservation was established expired April 25, 1926.

## INLAND FISHERIES

### GENERAL

The sentiment is gradually developing in the State for further restriction on the fishing in in our inland waters, particularly our great ponds. Most of the pond fish cannot be artificially propagated, and we are compelled to rely almost entirely on the natural reproduction to keep up the supply. The shores of our ponds are rapidly being lined with camps, which are utilized not only in summer, but increasingly so in the winter.



The ponds, too, are becoming more and more accessible through good roads. The fish life in these ponds will continue to gradually decline until such time as they are relieved of some of the present drain of excessive fishing. In the main we have comparatively short seasons on our upland game, and even with this rigorous restriction, it is no more than holding its own. Today most of our pond fish may be taken for 10 months out of the year, and during part of this period, including the intensive winter fishing through the ice, with 10 traps to a fisherman.

Our suggestion to reduce the number of traps to 5 per fisherman has not met with public approval. Neither has the suggestion to substantially curtail the period of winter fishing. This year we submitted a questionnaire to the fish and game associations on the proposition to stop all fresh-water fishing (except for brook trout) from January 1 to July 1, but it was overwhelmingly opposed. In 1924 the law was passed authorizing the Division, upon petition of the selectmen of the towns wherein the ponds are located, to set off not to exceed 25 per cent of a given great pond to be a closed breeding area. Although this act has been called to the attention of the selectmen on several occasions, no action has been taken by any board that has resulted in establishing a single closed area.

There has been some suggestion of a further restriction on the catch, and a raising of the legal length of most species. We do not believe that such regulations will meet the need for further protection.

It is encouraging to note that this year there was more sentiment expressed in favor of some further restriction than has been observed in many years. As the public attention is directed to the problem we believe that action will be taken. But it is useless to talk of improving the fish or game supply by any method of artificial propagation, or pond cultural work, or salvage work, until we have set our house in order to the extent of giving the natural stock in the waters or covers a reasonable opportunity to do its full share of natural reproduction.

### BROOK TROUT

The brook trout fishing season was the most unattractive and least productive in many years. In the early part of the season the weather conditions were very unfavorable. Cold, raw, northerly and easterly winds prevailed; the streams were swift, swollen with snow water, and overhung with ice; swamps were filled with water, in many cases frozen, and in many sections there was a considerable depth of ice on the ponds. Over a substantial part of the State the snow still lay deep, roads were impassable, and it was difficult to reach the streams. There were, of course, a few brooks where conditions were more nearly ideal.

Wardens patrolling the streams reported meeting a far smaller number of fishermen than usual, and only a small proportion had fish. By the first of May the weather warmed up and conditions approached normal; but thereafter the dry weather reduced the flow in many brooks so as to prevent the trout from going far upstream. On the whole, the season was a disappointment, and what good catches were made occurred mostly in the larger streams, the particularly choice brooks, and the special holes known to the veteran fishermen. Berkshire County proved an exception to the foregoing statements, for there, although the season was late, there were good catches and large-sized fish secured after the season warmed up.

In previous reports we have stressed the advisability of changing over our trout cultural methods by reducing the number of fingerlings distributed and increasing the number of trout large enough to be caught when planted. With the funds contributed by the fish and game clubs, together with a small appropriation, we were able, last year, to enlarge the pools at some of the hatcheries and construct new ones, thereby making it possible to carry, through the past winter, a larger lot of se-



lected fingerlings, to be liberated this year as trout large enough to be caught when planted. During this year there were planted 126,383 yearling and adult trout, (including brook trout and brown trout), which ranged in size from 6 to 10 inches.

Additional construction work at the stations, hereinafter detailed, has increased these facilities, with the result that at the time this report closes (November 30) there are being carried over upwards of 335,000 selected fingerlings (brook, brown and rainbow) to be planted next spring as mature fish.

The distribution of this number of trout will be a very large undertaking, particularly in the central and western parts of the State, where many streams will be inaccessible before, and even after, the opening of the season, on account of snow and ice on the roads. The handling of these fish will tax the ingenuity of us all, and it may become necessary to defer many of the shipments to the western part of the State until the open season is well advanced, or until after the close of the season in the early fall.

On the other hand, if the plantings are delayed until fall, we may be confronted with severe drouth conditions that will reduce many of our streams which are in splendid condition to receive fish in the spring, to a series of large pools. The placing of the fish in these pools in the fall presents a great temptation to poachers and an attraction to vermin of all kinds.

The ideal plan would be to scatter the fish very thinly over large reaches of the bigger waters and principal brooks during the month preceding the opening of the season, or of making very late plantings before the freeze-ups and snows of the winter. This latter plan has its disadvantage, in that we are placing artificially propagated trout in our waters at the beginning of the winter when the food supply is reduced to a minimum, as is the protective vegetation. When the time comes that the Division is equipped with a sufficient number of fast trucks, manned by fish messengers, and the planting is done entirely by skilled hands, many of these difficulties will be overcome.

### *Regulation of Fisheries of the Deerfield River*

The enactment of a law regulating trout fishing in the Deerfield River represents a commendable effort on the part of the organized sportsmen of a given locality to place limitations on their own sport for its preservation and betterment. The Deerfield River is an excellent trout stream, containing fish of large size, and affording fly fishing. The feeling of the local fishermen that, by judicious regulation, the fisheries of the river could be developed to a high standard of excellence, took form in a bill introduced by the League of Franklin County Sportsmen's Clubs, which became a law (Chapter 19, Acts of 1926). It provided that no trout less than 12 inches in length should be taken from that part of the Deerfield River lying between Shelburne Falls and the State line at Sherman, Vt., and established a catch limit of five a day. It further empowered the Director to declare a restricted area in said section of the river, and, subject to the approval of the Governor and Council, to make rules and regulations for the taking of trout therein. Acting on this authority, said section of the river was established as a restricted area for the purpose of breeding and developing trout, and the taking of fish therein was limited to capture by single rod and line held in the hand. On approval by the Governor and Council on May 12 these regulations became law.

There were some excellent fish taken from the Deerfield River this year.

### *LOCH LEVEN, BROWN AND RAINBOW TROUT*

After waiting for several years it has become possible to take, this fall, a very limited number of eggs from our own brood stock of Loch Leven or

brown trout. This is the first step in perfecting our plan to have on hand a sufficient brood stock to take upwards of 200,000 eggs annually, that we may have a substantial number of these fish for distribution in the larger, warmer streams which are particularly suited to them.

We believe that there is a large field for such plantings, not only in some of the larger streams, but that eventually, by using 10-14 inch fish, we can establish the Loch Leven in some of the larger ponds.

The rainbow trout has shown its adaptability to certain of the larger streams, particularly in the western part of the State, to the extent that it now has a definite place on our stocking program.

#### CHINOOK SALMON

By a process of elimination the Chinook salmon fishing has been reduced to two or three ponds—particularly Peters Pond, Sandwich, Cliff Pond, Brewster, and, to some extent, Sheep Pond, Brewster. Over a period of years we systematically stocked a number of ponds with these fish, only to derive no results except as above. In the future a limited number of Chinook salmon will be reared for the stocking of these particular waters, but we do not believe it advisable to carry on any extensive breeding in the future.

#### WHITE PERCH

We have continued the policy of stocking selected groups of ponds, scattered over the State, with white perch. This species presents many interesting questions. It is a common experience to have reported to us that the white perch put into a given pond in a given year have shown no results. Two or three years may pass, when, unexpectedly, the fish will appear in sizeable numbers. Then the fishing may decline for a year or two, only to pick up again at a later date. Likewise they are an uncertain quantity in accepting the bait. In one locality a certain bait or lure will do the trick, and in another be regarded as ineffective. Where the conditions are favorable (and very often this can be determined only by actual stocking) it is our experience that, sooner or later, substantial returns will be realized from stocking with these fish.

#### PIKE PERCH

There is little to report on the pike perch fishing. It continues to center around the upper reaches of the Connecticut River. During the year quite a number of large fish (from 20 to 30 inches) have been taken in these waters. With the 12-inch size limit, the daily bag limit of 5, and the close season in the spawning period (February 1 to April 30) this species is now reasonably well protected.

#### PICKEREL

Reports from all over the State would indicate that this fish is not holding its own. The size of the fish taken is gradually falling off. We have frequently stated that the pickerel is the most popular fish in the State, and affords sport to the largest number of our fishermen. With reasonable protection it would supply a splendid volume of sport each year, and a large food supply. It is being fully demonstrated that the present protection is insufficient to enable it, by natural reproduction, to meet the intensive fishing to which it is subjected. We have already called attention to the necessity of further protection, and the conviction grows that this can only be given by establishing a rest period or a close season covering a substantial portion of the year.

By Chapter 27, Acts of 1926, the penalty for taking short pickerel is increased from one to ten dollars for each fish, the same as for other species. This is quite necessary when it is considered how largely the



pickerel fishery in this State depends on the protection of law for its maintenance.

### SMELT

Whether or not smelt fishing will continue to flourish depends largely, if not entirely, on the extent to which the natural fresh-water spawning streams are kept free from pollution and the spawning beds protected during the spawning and hatching period. Every year we are confronted with the difficulty of compelling a certain element to keep away from these spawning grounds. This element would not only take the fish, but in the effort to catch them will wade up and down the streams, destroying the freshly deposited spawn. The smelt run at night, which complicates the giving of adequate protection.

Under existing law, smelt fishermen are not required to hold sporting licenses as is required of all fresh-water anglers. Since the smelt represent a splendid sporting opportunity, we believe that serious consideration should be given to an amendment to the license law to include smelt fishermen. We should annually expend a reasonable sum that our law-enforcement service may give this protection, and the fishing could be further improved by an annual re-distribution of a limited amount of the eggs deposited each year. There are coastal streams which could doubtless be developed into good smelt breeding grounds if funds were available to carry on an intensive stocking over a period of years.

### BASS

The bass fishing continues to show gradual improvement. The general impression prevails that bass become dormant in winter, and that they are not taken while fishing through the ice, but the reports are common that sizeable bass are hooked in nearly every part of the State by ice fishermen. We do not believe that bass should be placed indiscriminately in our ponds, but if the ponds are selected with care and the annual stockings limited to a representative list, we believe that this fishery can be improved over its present volume. Undoubtedly it is very significant that the bass story differs from that of the pickerel—the close season on bass extending from December 1 to June 30, a period of seven months, as contrasted with the protected season of the pickerel of only two months.

### HORNED POUT

There has been little change in the status of the horned pout. There is a growing sentiment in favor of the reduction of the present daily catch limit of 40 fish; also for a minimum length regulation. Some day, when the funds are available, we believe that these fish can be produced in large quantities by the pond cultural method that is now operated in a very limited way. That is to say, large selected brood stocks will be placed in natural or artificial ponds of good size, which will be drawn down annually and the small fish collected for distribution. By the selection of extra large fish for breeders, brought from various parts of the State, or from without, splendid results should follow extensive operations with these fish.

### PONDS

#### *Public Rights*

As the provisions of Chapter 453, Acts of 1923 become more fully understood, there will be greater activity on the part of our citizens to the end that public rights of way may be laid out to an increasing number of our great ponds. They are the only bodies of water in which



free boating, fowling and fishing have been preserved to the people from the very beginning of our government.

As time goes on we believe that such a public right of way should be laid out to every great pond in the State. They should be sufficiently wide to permit vehicles to pass in each direction, with a walk for pedestrians, and with an additional strip of land to permit of a certain amount of reforestation to beautify the approaches. In addition, at the point where the public way touches the high water mark of the pond, a suitable additional area on each side of the approach should be set aside for public picnicking grounds, parking of vehicles, launching and use of boats, and a sufficient beach for bathing.

As the physical lay-out is developed for pond after pond, the public will be encouraged to permit special supervision over these ponds; that is to say, undoubtedly some will be set aside to be permanent wild life sanctuaries, with authority given this Division to make such special rules and regulations as it may deem advisable. The interests of the hunter, the fisherman, the bather and those who may desire to make other uses of these waters, will be adjusted on a live-and-let-live basis. It is fair to state that the public does not comprehend the far-reaching effect of the first colonial laws (which in the main have been perpetuated) in guaranteeing to our people forever the public right to these splendid bodies of water. Little or nothing has been done to develop them in a business-like manner for intensive use by the public. It is a fruitful field for future action, both by our citizens and by our governing commissions.

#### *Great Ponds Stocked and Closed*

The following-named ponds were stocked under Section 28, Chapter 130, General Laws, and closed to winter fishing by regulations expiring (with the exception noted) on November 1, 1929: Long Pond, Littleton (from Feb. 1, 1926 to Nov. 1, 1928); Dennis Pond, Yarmouth; Snipatuit Pond, Rochester; Long Pond, Yarmouth; Snow's Pond, Rochester; Winnecunnet Pond, Norton; Quabbin Lake, Greenwich; Little Alum Pond, Brimfield; Mary's Pond, Rochester and Marion. The regulations applied to Congamond Lakes in Southwick in 1924 were rescinded when it was found that the process required by law had not been fully complied with, in that no public hearing had been held prior to the filing of the petition to this Division.

#### *Privately-owned Ponds Stocked*

By the provisions of Section 3, Chapter 131, General Laws relating to sporting licenses, the public is not required to purchase a license to fish in any inland waters which have not been stocked by this Division subsequent to Jan. 1, 1910. This limitation should never have gone into the original fishing license law when it became effective in 1919. It has been carried along in all subsequent changes in the license law, although for the last three years the Division, in its recommendations for legislation, has attempted to repeal it.

To make this provision workable, there is the added requirement that the Director shall furnish the city and town clerks (who issue the licenses) with "a list of inland waters stocked by him or his predecessors with fish since January first, nineteen hundred and ten, and annually, on or before January first a list of inland waters stocked by him with fish during the preceding year." The Division, in the years preceding 1910, may have expended substantial sums to stock various inland waters, which, owing to the large number of waters to be stocked, have not received stockings subsequent to that date. In all such waters the public may take, without a license, fish that the State has expended money and time to plant.

There is a large group of privately owned waters, usually reservoirs made by damming up streams, in which public fishing is permitted. In order to bring as many of these as is possible under the provisions of the license law, agreements have been entered into with a number of such owners, by the terms of which the public is permitted to fish in such waters for a period of ten years upon the same being stocked by the Division.

There are certain other private waters in which the owners are willing that the public may fish, but for one business reason or another do not desire to enter into the foregoing agreement covering a period of ten years. In some of these latter cases, in order to bring them under the above provision and that a license may be required of fishermen, some such waters have been stocked upon the written consent of the owner that fish may be put into these waters.

The retention of this clause relative to stockings subsequent to January 1, 1910 has been a constant source of annoyance, to say nothing of the loss of thousands of dollars in revenues from licenses. It has complicated the work of law enforcement, for it is necessary that the wardens prove, in all prosecutions for fishing without a license, that the waters in question have been stocked since January 1, 1910. It encourages certain individuals to try to "beat the game" by seeking out these waters, which has resulted in prosecutions, due to the fact that such individuals "took a chance" in waters which it turned out had been stocked.

We believe that a license should be required to fish all the inland waters, whether privately owned or not, except, perhaps, those private waters in which the owners artificially propagate their own fish supply.

Following is the list of privately owned ponds which were stocked on the stipulation of the riparian owners that the public may fish therein for a period of ten years.

Pond	Town	Fishing permitted to
Deborah Doane	Eastham	Sept. 21, 1935*
Russell	Chelmsford	July 30, 1935*
Bridges	Williamstown	Aug. 31, 1935*
Noyes	Westminster	June 30, 1935
Indian Lake	Worcester	June 18, 1935
Washingtons or Stewarts	Sterling	Dec. 14, 1935*
Hamilton or Holland Reservoir	Holland	June 3, 1936
Beaver	Bellingham	May 1, 1936
Heald Pond	Pepperell	May 1, 1936
Augutteback Pond	Oxford	Oct. 23, 1936
Lowe's Pond	Oxford	Oct. 23, 1936
Lower Mill Pond	Oxford	Oct. 23, 1936
Popes Pond	Oxford	Oct. 23, 1936
The Flats	Shrewsbury, Grafton	Sept. 17, 1928**
Hovey Pond	Grafton	Sept. 17, 1928**
Little Pond	Bolton	Nov. 27, 1936

Following is the list of privately owned ponds stocked with the consent of the owner, but without the stipulation permitting public fishing therein for a period of ten years.

Pond	Town
Whitman's Pond	East Weymouth
Long Pond	West Rutland

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\* Stocked in 1925 and omitted from the report of that year.

\*\* Stock on two-year agreement.



The following privately owned ponds were stocked on agreement by the owners to permit the Division in future to take an equal amount of stock from the resulting increase: Pond on property of W. Irving Bullard, in Wayland, black bass; pond on property of Admiral Francis T. Bowles, in Barnstable, brook trout.

### FISHWAYS

Several additional fishways were installed on alewife streams, the most important being those which opened up the entire Saugus River from the sea to the headwaters in Quannapowitt Lake, Wakefield. New fishways were also constructed on Herring River, Harwich, and Monument River, Bourne.

Following the usual practice all fishways were inspected at intervals during the spring run of fish, and the flow of water through them was regulated from early spring until the beginning of summer. On the newer and more important fishways this was done by men engaged specifically for this purpose—frequently employees of the mill companies—and who also recorded the species passing through the fishways day and night. Periodical inspections were also made by a representative of this Division.

#### *Saugus River*

*Universal Tide Power Company.*—At this dam, alewives surmounted without difficulty, and observations made below the Wallace Nutting dam (next above) where they were found in fairly large numbers, proved that the passage of the fish through the locks at this point had not been impeded.

*Wallace Nutting Dam.*—In January, 1925 the Division submitted to the owners of the site of this dam (known as the Scott Mill property) plans and specifications for the installation of a fishway over the dam. No action being taken by the owners of the mill property on these plans and specifications, a conference was held in November, 1925, with the owner on the grounds. At this time the owner was unwilling to install the fishway according to our plans and specifications, and it was finally agreed that the work should be done on the basis of changes and alterations in the original plans, and the owner's agent agreed that the work would be completed on or before the first of the following March. In view of the fact that at this conference certain changes were made in our plans and specifications, we made it plain to the owner of the dam proper that we would not agree to approve of these departures from our original plans; that we were willing he should go ahead with a modified scheme on his own responsibility, but we reserved the right to require any further changes if the modified arrangement was not effective in passing the fish over this obstruction. Upon inspection of the property around the first of March, 1926, it was found that nothing whatever had been done. After considerable controversy with the owner it was agreed that the Division's engineer should make certain changes in the present structure at a cost of fifty dollars, said amount to be paid by the owner. A rough set of boxes was installed early in May, and upon inspection, alewives were observed both outside the fishway and ascending it.

*Prankers Pond Fishway.*—As soon as arrangements for a fishway at the Wallace Nutting dam were completed, the matter of installing one on the property of the United States Worsted Company at Prankers Pond (the next obstruction above the Wallace Nutting dam) was taken up. The Company stated that they were even then starting the work, and before the first of March they had completed a very fine concrete fishway at a cost of some five thousand dollars. In order to have it ready for use this year, the work was done during the winter months when conditions were unfavorable, which added to the cost \$1500 more than would have been the case had they proceeded in good weather later in the year.



Our engineer reported it to be an exceptionally fine piece of work, true to plans and specifications, and the Company is deserving of the highest commendation for their co-operation.

*Collins Fishway.*—Late in September the owner of a farm in North Saugus, through which runs the Saugus River, requested our advice in installing a fishway on his property, where an old five-foot dam had been replaced to store river water for flowing a cranberry bog. This is the first instance where the owner of a dam has taken the initiative in complying with the State regulations concerning fishways. A conference was held with the owner, in which a survey of the premises was made, and the owner agreed to install a fishway at once along the lines indicated and in a manner which should be satisfactory. The work was completed early in November, and was found, on inspection, to be a good job. The actual working of the fishway cannot, however, be observed until the run in 1927.

The completion of this last fishway has opened up the entire Saugus River from the sea to the headwaters.

### *Ipswich River*

*Ipswich Mills Fishway.*—Unfavorable weather and water conditions prevented satisfactory observations of the actual working of this fishway in 1925. In 1926 the first alewives were noticed in the river on May 3, and a good run from then on, covering the period May 12 to June 12, appeared in the fishway. From May 7 to 12 no fish were observed either in the fishway or the river, owing, undoubtedly, to the extremely heavy flow of water at this time. On May 14, there was a good run of fish in the river, but few seen in the fishway. A large number had congregated under the dam. On May 20, a very good run was reported, and these fish had been running for two days, experiencing no difficulty whatever in making they way up through the fishway. The observer estimated that there were ten barrels of fish in the fishway on May 21.

It was noticed that the very cold spring apparently affected the run, for there would be a very good run for a few days, and then it would drop off almost entirely. On May 22, only three alewives were seen in the fishway, but a larger number were observed about a mile down the river. On May 27, a large school of alewives was observed in the river. On June 1 to 9, not one was seen. June 10 to 12, a number were seen below the dam on the opposite side of the fishway, and after June 12, none were seen, so the run apparently ended previous to this date. The observer reported that the biggest run of fish took place on the ebb tide, and it was his opinion that it is not so much the dye stuff from the mill that prevented the fish from ascending the stream in greater numbers, as the waste gas and motor oils emptied into the river from garages.

*Norwood Mills Fishway.*—Though careful observations were made at this, as at all fishways, not an alewife was seen in the fishway or in this part of the river, and it is the belief of the observer at the Ipswich Mills fishway (next below) that the fish, after passing through the Ipswich Mills fishway, follow the main channel to Miles River, where it is impossible for them to surmount the dam. Large schools of fish were seen breaking water in this vicinity, and were identified as alewives. The matter of the installation of a fishway at that site will be taken up with the owner before the next run of fish.

*Willowdale Dam.*—The new cement fishway constructed on the Willowdale dam in November, 1925, was in operation for the first time. It proved to be a good type, and the fish surmounted it without difficulty. Between April 22 and June 30 59 shiners and dace, 34 yellow perch, 12 trout, and 701 miscellaneous fish (eels and flat fish) but no alewives, passed through the fishway.

### *Parker River*

No fishways were installed on the Parker River. On May 21, an exceptionally heavy run of alewives was reported in the Parker River at Byfield, with great congestion below the first obstruction on the stream. A fishway at this point would remedy the situation and establish a fishery without further effort on our part, for the alewives here are seeking a way to continue on up to former natural spawning grounds in the three great ponds above.

### *Merrimack River*

*Lawrence Fishway.*—Extremely high water conditions through the early part of April prevented connecting the iron flume of the fishway with the dam proper, and not until April 22 was the fishway in actual operation. This is the fifth year that observations have been made. The records show a decided increase in the number of fish using the fishway, particularly alewives.

*Lowell Fishway.*—This year completed a five-year period of special observations, and a steady increase is shown in the number of fish using the fishway—1,478 alewives in 1926 against 757 in 1922. Alewives were observed here five days before their first appearance at Lawrence, indicating that apparently large numbers passed through the Lawrence fishway either at night or at some time when the observer was not on duty. Between April 24 and June 30, the following were seen at the fishway. 1,478 alewives, 242 shiners and dace. On June 8, observations between 1 and 1.45 A. M. revealed an extremely large school of true alewives in the fishway, some measuring as long as 15 inches.

### *Paskamansett River*

*Cummings Fishway.*—Observations were made in the fishway on the Cummings dam, Russells Mills, South Dartmouth, and the unfavorable conditions previously reported were found to still exist. Early in May, the Division's engineer, who designed this fishway, made the first examination of it since installation. He found it wholly unlike that designed by him in 1919, also that it had been installed in a different location than that which he had advised. The side walls were not carried up to the height called for in the plans, so that, during the high-water period, the fishway is entirely submerged. The fishway will not function properly except when the pond above is drawn off, and the same conditions restored as with the brook flowing naturally.

Much of the flow from the pond came through another branch of the river, being fed by a 12-inch pipe which has no valve, and which if constantly left open, would necessitate the screening off of the west branch of the river to attract alewives into the east branch, on which the fishway is located.

Alewives were first seen in the river about May 3 in Turners Pond, above Smith's Mills. As the five-year period has now passed since the installation of this fishway, negotiations will soon be opened with the owner for the correction of the present conditions.

### *Taunton River System*

The entire Taunton River system was thoroughly checked up, and any unfavorable conditions noted were corrected. Manufacturers operating plants located on the dams of this river system co-operated with the Division by making changes suggested, and by permitting their employees to make daily observations of fish using the fishways, as well as to regulate the flow of water through the ways.

*East Taunton Fishway, Raynham.*—The fishway on the dam of the Connecticut Mills was in operation from April 12 until well into the sum-



mer. The first alewives were seen below the dam on April 11. An extremely heavy run of fish was reported during the last week in April and the first two weeks in May. In fact, many more alewives ascended this stream during this year than last, proving, it is believed, that the planting of adult stock is bearing fruit.

Early in May, the water in the river was extremely low, scarcely enough to operate this fishway, with a big run of fish attempting to ascend. There was water enough in the raceway above the top box, so that by making a large opening in the top box, enough water was permitted to escape through the fishway to allow the fish to surmount easily. This condition can be overcome another year by lowering the top box base to the bed of the river or at least to the base of the fishway. This matter will be called to the attention of the mill owners before the next run of fish, and the necessary repairs and changes made.

*Jenkins Leatherboard Company Fishway.*—Most gratifying results were reported in this fishway (on Town River, West Bridgewater). On April 30 the alewives made their first appearance of the season at this mill in Prattown, a school numbering probably several thousand. The water wheels in the mill were shut down from 11 P. M. to 7 A. M., thereby directing more water through the fishway, and if the fish used the way at all, it was at this time. In the previous year only a few hundred were seen, probably the results of the first planting of adult fish. The large number observed this year pointed conclusively to the success of the alewife planting during the past five years.

At this location the alewives preferred to go up stream against the strongest current, which was from the flume where the water wheels are located, but they could get no farther, which necessitated turning them back down stream and screening off the flume, compelling them to make the trip up through the fishway. After this was done, careful watch was kept at the fishways above to check the number running. (For details see other fishways located on this river system.)

On May 24—131 adult spawning alewives from the East Taunton fishway were planted just above the Jenkins Leatherboard Company fishway, to continue the restoration of this fishery, and these were seen ascending the next fishway above. This planting was done to ascertain which way the fish would travel, that is, the Satucket branch to East Bridgewater, or the Town River to West Bridgewater. They took Town River to West Bridgewater, at the Jenkins Leatherboard Company at West Bridgewater and Prattown, which is the last fishway on the Taunton Great River, before East Taunton is reached going down stream. Alewives were seen several days ascending the fishway. Thanks and much credit are due Superintendent Fuller of the Jenkins Leatherboard Company, for his assistance, interest and co-operation in getting these fish over the dam of his company.

On May 11, large numbers of alewives were observed in this fishway. On May 21 large numbers of alewives were observed ascending the fishway. On May 24 and 25, several hundred fish were observed at various times in the pond above the dam, and evidently used the fishway to descend, as they eventually disappeared and no dead fish were seen below the wheels. Between May 1 and 21, 1,815 alewives were recorded as passing through this fishway. On June 22 the fishway was closed, no fish having been seen for several days.

*Stanley Works Fishway.*—In this fishway (on the Town River, West Bridgewater) large numbers of alewives were observed below this dam, proving the efficacy of planting adult spawning alewives in the headwaters. 201 alewives were planted directly above the Stanley Works fishway on May 11, collected below the dam at the East Taunton fishway. This planting gave us adult alewives between the Stanley Works fishway and the Easton Investment Company fishway at West Bridgewater, in addition to those planted between the Jenkins Leatherboard Company



fishway, Stanley Works fishway, and the Carver Cotton Gin Fishway, on the other branch toward Monponsett Lake.

There is still need of a screen across the stream from the lower end of the fishway to the opposite bank, and the officials of the Company have indicated their willingness to install one. From April 26 to June 4 there were 52 alewives, 4 shiners and dace, and an unrecorded number of miscellaneous fish (as well as numerous schools of alewives uncounted) observed in the fishway.

*Easton Investment Company Fishway.*—Conditions all through the spring were ideal at this fishway for any species of fish ascending it. A nearby resident reported, from April 12 to 16, schools of hundreds of large yellow perch at a time, using the way. In addition, pickerel were noted.

Careful watch was kept for alewives, both those that had been planted above the Stanley Works fishway and the regular run, but only three were seen. Probably none ascended the Town River to this point at the Eastern Investment Company fishway, and those which were planted above the Stanley Iron Works fishway, in addition to those that came up from the Jenkins Leatherboard Company fishway and through the Stanley Works fishway, remained and spawned in the pond on that enlarged, broadened-out section of the river above the Stanley Works mills. The bridgework, which has been under way the entire spring and summer, between the Stanley Works fishway and the Eastern Investment Company fishway, probably interfered with their progress up the river to this point, and undoubtedly had a tendency to scare them back.

*Hanson Cedar Company Fishway.*—This fishway (on Stump River, Halifax) functions properly only when there is sufficient water in the river. Changes will be required of the owner after a lapse of the five-year period from installation.

*Carver Cotton Gin Company Fishway.*—This fishway, located on Sackett River, East Bridgewater, has never functioned satisfactorily since its installation over five years ago. The owners have signified their willingness to receive suggestions for changes. On April 20 the fishway was inspected to determine what changes could be made to make it work more adequately. It was decided, however, (inasmuch as the alewife has not yet appeared in this branch of the river) to defer asking the owners to incur the expense of alterations until alewives are actually seen outside the fishway and unable to ascend. Though careful watch was kept, both by employees of the company and by representatives of the Division, no alewives were seen this year. About the middle of April schools of yellow perch were observed using the fishway.

*Electric Light Power Plant Fishway, and Star Mills Fishway.*—These two fishways, located on the Nemasket River, Middleboro, were inspected periodically during the spring, and large numbers of fish were observed surmounting them without difficulty. The fishing right was not sold by the town this year, and all fish passing upstream were permitted to reach the spawning beds.

#### *Agawam River—East Wareham*

This fishway was found to function properly, and large numbers of alewives ascended to the spawning beds. Mr. George M. Besse of East Wareham operated the fishery again this year, having purchased the right from the town of Middleboro.

#### *Monument River*

*Bournedale Fishway.*—In the late fall of 1925, the repairs and alterations on the Boston, Cape Cod and New York Canal Company's fishway were completed. The Division's engineer, who designed the plans and specifications for these changes and repairs, inspected the job early in

January and reported the work to be true to plans and specifications, and that, in spite of the difficulties of combatting swift tides and wash from passing boats, the owners had turned out an excellent piece of work.

Early in the spring, Mr. George M. Besse of East Wareham purchased the fishing rights on this stream for the next five years. For a year or two previously, Mr. Besse had the fishing privilege, and during that time he had constructed a wooden fishway alongside of the cement construction, which, he claimed, gave much better results than the concrete construction in getting the fish upstream. Mr. Besse applied to this division for the right to construct a somewhat similar permanent fishway alongside of the large original concrete construction, that is, he wished to relay some of the stone which had been piled against the side of the fishway for about one-half its distance, running from the top down, in order to make a fishway about three feet wide. After these stones had been put into position, he wished to float concrete in among them, in order to make a solid piece of construction.

From this point down into the canal, it was planned to put in a temporary wooden fishway, three feet wide. In order to do this, it was necessary to take out some of the rock along this side of the canal, which had been banked in. Mr. Besse stated he was willing to relay the rocks alongside of his fishway in such a manner as to give the original structure as much support and protection as it then received from this rock in position. He was also willing to dump 500 tons of rock along the shore in between his fishway and the canal, as additional protection to the rocks which the Canal Company had put there, and was also willing, of course, to assume all financial responsibility for installing this fishway.

It was the opinion of Mr. Besse, after carefully inspecting the original fishway which had been repaired, that during a certain stage of the tides, alewives are unable to enter the fishway for the reason that the surface of the water would be too far below the down-stream entrance to the fishway, thus resulting in barring the fish from ascending it for a substantial period of each day. Mr. Besse finally obtained permission from the Canal Company to proceed with the construction of his own type of fishway, which was in operation on April 15.

From April 15 to May 17, 300 barrels of alewives had been taken at the catching place above the fishway, and on May 17 it was estimated that there were 2,000 barrels of alewives then in the canal, and these Mr. Besse had planned to allow to run to the spawning beds. Observations made of both fishways on the canal showed that 102 alewives passed by a given point through the Besse fishway in one minute, as compared with 20 alewives which passed by a given point in one minute through the original concrete construction.

#### *Red Brook, Cataumet*

The usual observations were made, and nothing unusual was noted. Conditions were found to be the same as in the year previous. The fishway is still in need of repairs, and it is expected that the existing conditions will be corrected during the coming year.

#### *Cole's River, Swansea*

*Montaup Electric Company Fishway.*—Observations were made at various times in the new "Keil" type of fishway constructed on the property of the Montaup Electric Company. While there were a considerable number of alewives in the river, none appeared able to surmount the fishway, due to the heavy flow of water and the lack of facilities in the construction of the fishway for regulating the flow of water. The company has been requested to make changes in the structure during the coming year.



### *Herring River—Harwich*

*United Cape Cod Cranberry Company Fishway.*—Early in March application was made to this Division by the United Cape Cod Cranberry Company for advice concerning the installation of a fishway in the flume, constructed by them on newly-acquired property, by which they control the water for flowing their cranberry bogs above. The location of this flume is at a point on the river used in past years as a catching place by the purchaser of the herring rights. Desiring not to conflict in any way with the herring interests of the town, the company wished to install a herring run which would be satisfactory to this Division. Surveys were made, plans and specifications furnished to the company on March 23, and by early June a fishway had been completed, true to plans and specifications, which appears to be adequate to enable the fish to surmount the dam without difficulty.

### *Robbins Pond—East Bridgewater*

*United Cape Cod Cranberry Company Fishway.*—On receiving notice from the United Cape Cod Cranberry Company of their intention to construct a fishway at the outlet to Robbins Pond, East Bridgewater, a conference was held and plans and specifications submitted the middle of September. The fishway is to be installed at the locality decided on at the conference, namely, that part of the pond near where the channel previously flowed. This will give the alewives and other anadromous fish clear passage to and from this pond, and the fishway will undoubtedly be completed next spring.

## POLLUTION

A few complaints of pollution in inland waters were reported to this Division, and were investigated. No serious problems arose, however, and in the cases reported the offenders indicated their willingness to correct the difficulties.

## PROPAGATION OF FISH AND GAME

### FISH HATCHERIES AND GAME FARMS

#### *General*

Certain items of new construction and replacement were advanced at the fish hatcheries and game farms during the year. These changes were financed partly by further expenditures of contributions from the local fish and game clubs and the county leagues (see Acknowledgments), and partly from our very limited appropriation for new construction work.

The year's experiments with the brail went far to confirm our original belief that this device could be used to great advantage in carrying six to eight-weeks' old pheasants to maturity in open pens, by confining one wing.

Year after year the cost of fish food has increased. Experience has shown pork liver to be the best all-round food, and this, today, costs six cents a pound. The feed bills at the hatcheries and game farms form a very large item in the annual cost of operation. We are constantly studying methods of reducing these expenses, while at the same time giving the stock a suitable ration. We have begun experiments in feeding horse meat to the fish from the 4-5 inch fingerling size up, as a substitute for the higher-priced liver. This year we are carrying over, for rearing to larger size, a greater stock than ever before in our history, of selected fingerlings, and they consume large quantities of food.



A considerable amount of reforestation was done at all the stations, with stock supplied from the Division of Forestry, mostly poplar, spruce, fir and arbor vitæ.

### *Amherst Rearing Station*

In addition to construction done with funds contributed by the fish and game clubs, appearing elsewhere in this report, further construction was done out of the general appropriation, as follows: During the early part of the winter, part of the land adjoining the hatchery grounds now under lease were brushed out, in order to have them ready for surveying. During the summer the surveying was done and the areas suitable for rearing work were laid out into pools and ponds. One section was cleared of trees and stumps preparatory for the construction of large pools. The concrete foundation for an addition 12 x 20 ft. to the superintendent's cottage was put in and the materials were gotten on to the ground to cover most of the outside construction of the addition. There were 3,750 trees set out.

*Brook Trout.*—The year opened with 21,800 fingerling brook trout on hand, (a recount added 3,800 to the previous inventory). 500 were lost, and 21,300 were distributed the following spring as yearlings.

For the work of the season 134,200 fry were received from the Montague Rearing Station, 185,102 from the Palmer Fish Hatchery, and 200,000 from the East Sandwich Hatchery. These resulted in 284,102 fingerlings, to which were added, late in September, 15,000 (3-4 in.) from the Montague Rearing Station and 3,000 (4-5 in.) from the Sutton Fish Hatchery. There were losses of 58,400, distribution of 220,000, and 23,702 remain on hand to be carried through the winter for spring distribution.

*Loch Leven and Brown Trout.*—After conducting experimental work with the brown and Loch Leven trout at the various stations it was decided to concentrate the work at the Amherst Rearing Station, and during the summer and fall all of the stock was assembled here.

(1) *Brown Trout.*—The year opened with 7,760 brown trout fingerlings on hand. 5,050 were distributed as yearlings, 2,110 were lost, and 600 remain on hand November 30.

404 adult brown trout were received from the Palmer Fish Hatchery, of which 44 were lost, 12 sent to fairs and thence distributed, and 348 remain on hand November 30.

(2) *Loch Leven Trout.*—The year opened with 4,000 Loch Leven trout fingerlings on hand, which were later transferred to yearlings. To these were added 4,185 yearlings from the Palmer Fish Hatchery, making a total of 8,185. 604 were lost, 6,400 were distributed, and 1,181 remain on hand November 30.

In November 9,200 fingerlings were received from the Palmer Fish Hatchery, which are also on hand at the close of the year. There are now assembled at this station a fine lot of brown and Loch Leven trout in the process of development, from which it is planned eventually to collect from 200,000 to 500,000 eggs.

### *Montague Rearing Station*

Before the active work of the year began the hatchery building and equipment was painted and put in condition to receive stock. In addition to the work done with funds contributed by the fish and game clubs, appearing elsewhere in this report, further work was done out of the general appropriation, consisting of surveying, early in the summer, a portion of the grounds at the lower part of the hatchery. This entire area was later cleared of brush and trees. On this large area the large pools previously referred to were constructed. A good start

was made in planting trees, which will be continued along with the development of the station. 1,215 were set out this year.

*Brook Trout*.—15,000 fingerlings were on hand when the year opened. Beginning in April and continuing throughout the year as the work permitted, 13,599 were distributed as yearlings. There were losses of 601, and the remaining 800 are on hand November 30, to be carried through the winter.

No eggs were collected this year, as the brood stock was distributed before the spawning season in the near-by rivers, so that all the ponds might be cleaned and the banks rebuilt. 575,000 eggs were purchased, and 225,000 received from the Sandwich Hatchery. One lot of the commercial eggs was in poor condition and several thousand bad eggs resulted. The total hatch of fry was 700,350, which came along very well except the fish from the poor shipment. By the last of March all the fry were in the pools outside. 134,200 fry were shipped to the Amherst Rearing Station, and 197,929 were lost. The losses were confined to the one poor shipment, in which losses were experienced until the fish had been feeding in the outside ponds for five weeks. After that they did as well as the others. The balance of 368,221 fry were transferred to fingerlings, to which were added 17,104 ( $1\frac{1}{4}$  in.) from the Palmer Hatchery, making a total of 385,325. From this number 15,000 (3-4 in.) were sent to the Amherst Rearing Station, 265,825 distributed, and 4,500 were lost, leaving 100,000 on hand November 30 to be carried through the winter for spring distribution as yearlings.

The distribution work was greatly facilitated by the courtesy of the Forestry Division in loaning their large Mack truck for the shipments into Berkshire County.

*Rainbow Trout*.—From the U. S. Bureau of Fisheries Station at White Sulphur Springs, West Virginia, 25,000 rainbow trout eggs were received in exchange for brook trout eggs. Of these 18,606 hatched into strong, healthy fry. After having fed for four weeks they started to drop off, with no apparent reason except possibly the change of conditions. The losses were estimated at 8,560. The remainder were transferred to ponds up the back stream, where they finally came along very well the rest of the summer, resulting in 10,046 fingerlings. 150 were lost, 250 exhibited at fairs and thence distributed, and 9,646 remain on hand to be carried through the winter for further rearing.

### *Palmer Fish Hatchery*

In addition to the work done with funds contributed by the fish and game clubs, described elsewhere in this report, further construction work was done out of the State appropriation, as follows: A new iron screen was installed at the outlet of the dam in front of the hatchery building, and a new platform laid in front of the hatchery building to replace the old one. The bass ponds were cleared of vegetation, the mud thoroughly cleaned out of Pond No. 1, and the bottom of the latter nearly covered with sand to fill up the low spots and make the bottom more level. 500 trees were set out.

*Brook Trout*.—The 300 fingerlings on hand December 1 were lost. 575,000 brook trout eggs were purchased, of which 350 were given away for study and experimental purposes, and 36,801 lost. Of the 537,849 fry hatched, 185,102 were sent to the Amherst Rearing Station, 137,200 to the Sutton Fish Hatchery, and 43,967 lost. The resulting 171,580 fingerlings were disposed of as follows: 25,000 (2 in.) to the Worcester County Fish and Game Association rearing station; 17,104 ( $1\frac{1}{4}$  in.) to the Montague Rearing Station; 19,000 ( $1\frac{1}{4}$  in.) to the Sutton Fish Hatchery; 53,895 lost; 26,930 distributed; and 29,651 remain on hand November 30 to be carried through the winter for spring distribution as yearlings.



139 adult trout salvaged from the supply pond were distributed.

*Brown Trout.*—At the opening of the year there were 15,000 brown trout fingerlings on hand, 13,250 of which were lost and 1,750 distributed as yearlings.

There were also on hand 600 yearlings, which were transferred to adults.

There were also on hand 5,628 adults, which, plus the 600 transferred from yearlings above, made 6,228 adults handled during the year. Of these, 404 were sent to the Amherst Rearing Station, 1 to the Eastern States Exposition and thence distributed, and 5,823 lost.

*Loch Leven Trout.*—The year opened with 7,700 fingerlings on hand, of which 26 were lost and the balance of 7,674 transferred to yearlings. 3,489 were lost, and 4,185 were shipped to the Amherst Rearing Station.

100,000 Loch Leven trout eggs were received from the U. S. Bureau of Fisheries Station at Bozeman, Mont. in exchange for brook trout eggs. These produced 87,966 fry, 27,990 of which were lost, and the remaining 59,976 transferred to fingerlings. Of these, 9,200 were sent to the Amherst Rearing Station, 41,751 lost, and 9,025 distributed.

*Horned Pout.*—From the supply of horned pout fingerlings purchased from the Carter Pond Company and held over from last year, there were distributed 20,000 fingerlings and 6,150 yearlings. From the hatchery stock there were distributed 5,175 fingerlings, 175 yearlings and 17 adults.

*Small-mouth Black Bass.*—There was a very successful hatch of small-mouth bass. As an experiment, 14,000 fry were shipped to the Stockwell Ponds, to be reared, if possible, into fingerlings. 137,000 fry, 31,550 fingerlings, 650 yearlings and 8 adults were distributed.

*Blue Gills.*—From the supply pond at the hatchery, 4,590 blue gill yearlings (2-4 in.) were collected and distributed.

*Pickereel.*—When the supply pond was drawn down there were collected and distributed 750 fingerlings and 308 adult pickerel.

### *Sandwich Fish Hatchery*

In addition to the work done with funds contributed by the fish and game clubs, described elsewhere in this report, further construction was done out of the State appropriation, as follows. Two new ponds (15 x 100 ft.) were built, and four of the ponds constructed last year were completed by taking the dirt from the new ponds and building up the sides. Four wells were driven to give a larger supply of water to the new pools. The roofs of the hatchery building and the meat house were repaired and considerable additional grading done around the new developments. 24 feet of 24" tile was placed under the road at the Sandwich hatchery to carry off the surplus water. Six hundred trees were set out.

*Brook Trout.*—At the beginning of the year there were 55,850 fingerlings on hand, 11,668 of which were lost and 44,182 transferred later to yearlings. Of this number 188 were lost, 40,365 distributed, and 3,629 remain on hand November 30.

There were also on hand, the beginning of the year, 7,178 adults, of which 3,157 were lost, 650 distributed, and 3,371 are on hand November 30.

1,176,000 brook trout eggs were collected from the station stock and 50,000 purchased. Of these 250,000 were transferred to the East Sandwich Hatchery; 125,000 sent to the U. S. Bureau of Fisheries (in exchange for Loch Leven and rainbow trout eggs sent to the Palmer and Montague Fish Hatcheries), 225,000 to the Montague Rearing Station, and 50,000 to the California Fish and Game Commission in exchange for Chinook salmon eggs furnished to the East Sandwich Hatchery.

Of the 512,000 fry hatched, 55,930 were lost and 456,070 transferred to fingerlings. From the fingerling stock 182,400 (1¼ to 1½ in.) were



sent to the Sutton Hatchery; 25,000 ( $1\frac{1}{2}$  in.) to the Canton Fish and Game Association rearing station; 25,000 ( $1\frac{1}{4}$  to  $1\frac{1}{2}$  in.) to the Peabody Fish and Game Association rearing station; 50,400 ( $1\frac{1}{2}$  to 2 in.) to the Worcester County Fish and Game Association rearing station; 11,500 (2 to  $2\frac{1}{2}$  in.) to the Peabody Fish and Game Association rearing station; and 60,700 distributed. 1,182 were lost, and 99,888 remain on hand November 30 to be carried through the winter for spring distribution as yearlings.

*Brown and Loch Leven Trout.*—472 brown trout fingerlings on hand December 1 were added to the 3,359 Loch Leven fingerlings, making a total of 3,831 brown and Loch Leven trout on hand. 2,246 were lost and the balance of 1,585 transferred to yearlings. Of these 765 were lost and 820 distributed.

#### *East Sandwich Fish Hatchery*

In addition to the work done with funds contributed by the fish and game clubs, described elsewhere, further construction was done out of the State appropriation, as follows: One pond was dug out and a new dam built across the lower end, making a large pond 45 x 60 ft. Two additional ponds were enlarged to 25 x 50 ft. by tearing out the wooden partitions and digging back into the banks in order to have as much natural dirt sides to these ponds as the lay of the grounds would permit. Two of the ells on the Nye house were torn down, the openings shingled over, and the cellar under one filled in and the ground graded.

*Brook Trout.*—Of the 30,000 fingerlings on hand the first of the year 5,886 were lost and the balance of 24,114 transferred to yearlings. 19,897 were distributed, 621 lost, and 3,596 remain on hand November 30.

There were also on hand, at the beginning of the year, 650 adults, 300 of which were distributed and 350 lost.

The egg stock consisted of 100,000 collected from the brood stock and 250,000 from the Sandwich Hatchery. 100,000 were lost, and 250,000 fry hatched. 200,000 fry were sent to the Amherst Rearing Station, 3,680 were lost, and 46,320 transferred to fingerlings. 12,500 fingerlings were distributed, 351 lost, and 33,469 remain on hand to be carried through the winter for spring distribution as yearlings.

*Chinook Salmon.*—50,000 Chinook salmon eggs were received from the California Fish and Game Commission (in exchange for brook trout eggs), 13,050 of which were lost and 36,950 hatched. 2,500 of the fry were lost, and the remaining 34,450 transferred to fingerlings, which were disposed of as follows: 2,050 lost, 14,400 sent to the Dighton Fish and Game Club rearing station, and 18,000 distributed.

#### *Sutton Fish Hatchery*

Repairs and replacement were more extended than usual, and carried on more or less actively during the whole year, with particular attention to the buildings, and to pools that could be used in carrying yearlings.

In addition to the work done with funds contributed by the fish and game clubs, described elsewhere in this report, further construction was done out of the State appropriation, consisting of the following. The decayed lower walls of the meat house were replaced with concrete, floor drainage improved and the walls above the new concrete cleaned and repainted.

In the hatching building decayed sections of roof and finish were replaced and the roof recovered with slate surface paper. Glass was reset and the windows and the outside of the building painted.

Rearing boxes made for outside use were refitted and set inside the building for the handling of pond fish in course of distribution.

The piazza of the superintendent's house was rebuilt, copper wire screens installed, window sash puttied and painted, and minor repairs made.

The old barn was repainted on the three most exposed sides, and the part used as the truck garage partly sheathed inside with sheet rock. In addition, a concrete wall was built inside below the sheet rock for fire protection.

The new barn, being no longer used for keeping a horse, was made over for general storage and special purposes.

Another lot of rearing boxes was set out-doors below the dam at the rear of the ice house, and fitted for carrying and sorting yearlings during the distribution period; also to handle pond fish.

The shipping stand was rebuilt with a heavy timbered frame, and concrete main supports. A holding pool was also constructed underneath for the handling of fish for distribution.

The stock of trees for planting about the ponds was increased by 3,500 from the Forestry Division and planted in beds at the hatchery for further growth while the land for planting is being cleared. With the work of caring for these trees, a selection of shrubs and trees for bird-feeding was planted, and transplanted in beds from previous plantings. The stock now numbers several thousand, and will be fully doubled by the plantings of this year, which included 2 barrels of black walnuts donated for this work. Earlier plantings of 12 to 15 years ago are showing interesting results in natural seedings, extended through the fields and woods for some distance, where the birds have carried the seed, and this seeding has been so extensive that a large number could be taken up for replanting in beds for adding to the stock.

*Brook Trout.*—Of the 36,000 fingerlings on hand at the opening of the year, 1,000 were distributed as fingerlings and the remainder placed in pools for rearing to yearlings. 19,000 were lost, 15,800 were distributed as yearlings from March to November, and 200 remain on hand November 30.

Stock for the year's operations was received as follows: from the Palmer Fish Hatchery, 137,200 fry of which 87,000 were lost. With the remaining 50,200 the pools were restocked. To these were added 182,400 fingerlings ( $1\frac{1}{4}$  to  $1\frac{1}{2}$  in.) from the Sandwich Hatchery, and 19,000 ( $1\frac{1}{4}$  in.) from the Palmer Fish Hatchery. 3,000 (4-5 in.) were shipped to the Amherst Rearing Station. The conditions for growing were good, and they made the usual growth on a much reduced ration, with more infrequent feedings. There was an unusual low stage of water through the greater part of the season, owing to the extreme drouth. This was the third in annual succession, with a progressive lowering of the ground water each year. It hampered the work most by the necessity of keeping the reserved fingerlings crowded during the season when the pond fish were brought in and kept in large numbers, and this, to some extent, affected the growth during the fall months. Of the fingerlings 71,300 were lost, 147,300 distributed, and 30,000 remain on hand to be carried through the winter for spring distribution as yearlings.

*Brown Trout.*—At the opening of the year there were 1,200 fingerling brown trout on hand, of which 900 were lost and 300 distributed as yearlings.

*Loch Leven Trout.*—The 800 on hand at the opening of the year were lost.

*Pheasants.*—Early in September 300 young pheasants were received from the Marshfield Bird Farm and carried in the refitted bird pens through winter for spring liberation.

## FIELD PROPAGATION

### *Pond Cultural Work*

The work of taking pond fish from the Stockwell Ponds, preparatory to distribution, was finished just at the close of the previous year. These were distributed during the winter and spring.



The dams were further strengthened and raised. As a result, all the ponds were brought to a higher level, practically high-water mark, in the spring, and a higher average level maintained through the whole season, including the long and severe drouth.

Tree planting was continued with spruce, and red, white and Scotch pines supplied by the Forestry Division, chiefly around No. 3 pond and in the abandoned cemetery.

Lowering of the water in the ponds for fall work started early in October. Distribution began just before the middle of the month, chiefly with blue gill fingerlings, as it was evident that these were in the ponds in large numbers, and could be taken without mixture with the other fish by a slow run of water, without drawing the ponds low. In this way the blue gill fingerlings were taken from Ponds No. 1 and No. 2 in the lower trap, and from Pond No. 3 in a trap built below that pond. This method has the advantage of avoiding the injuries and losses among these small fish incident to their struggles with the larger fish, and saves the tedious work of sorting.

This work was practically completed when a series of rains, five in November, and each followed by a considerable flow of water, suspended the work with the other fish. At the close of the fiscal year the young stock had been entirely removed from Pond No. 1 and a part of the fish taken from No. 3. No. 2 had been practically drawn off to run the fish to the lower trap, but none of the larger fish had been taken. At this point the operations showed an excellent breeding year for blue gills. The pickerel, horned pout and perch fingerlings (this year's production) did not show up in numbers to indicate the usual increase, and the size was below average; but yearling pickerel, blue gills and horned pout were being taken in large numbers from the stock left where the work was incomplete the previous season.

Distributions from the pond for the period of this report (Dec. 1, 1925 to Nov. 30, 1926) were: 134,300 fingerling and 785 yearling blue gills; 79,400 fingerling and 12,065 adult horned pout; 19,050 yearling yellow perch; 2,700 fingerling and 350 adult (10-14 in.) pickerel.

During the year 14,000 black bass fry from the Palmer Fish Hatchery were planted in the lower pond.

#### *Ayer Game Farm*

Repairs (replacing decayed sills and floor joists and relaying floor in one portion of house) were made to the house, including the rearrangement of partition walls, painting, and rebuilding of a concrete cellar bulkhead and the laying of a concrete porch. Certain of the rooms were repainted and papered.

A number of young fruit trees, grapevines and berry plants were purchased and set; two plats of ground that had been in hoed crops the year before were seeded to a clover mixture, with oats for a nurse crop. The ground occupied by the pens during the preceding summer was broken up and corn, kale, mangles, etc. planted. In spite of an extremely dry summer and a killing frost on June 17, good crops were raised and harvested; but, due to the dry season, the hay crop was very light. In September, 600 young evergreens from the Division of Forestry were set out in waste areas desirable for reforestation.

The station, closed since the preceding July, was re-opened December 1. Pheasants were received for egg-producing stock, 219 from the Marshfield Game Farm and 188 from the East Sandwich Game Farm (being the 201, minus 13 lost in transit, recorded in last year's report). Only routine work and feeding and caring for the birds was carried on up to March 1, when the busy season began. Pens were prepared for breeders, brush cut and bound into faggots for nesting shelters, and sanitary watering devices made. At the beginning of the laying season the stock, reduced by losses of 13 and distribution of 2, numbered 392,



from which 14,375 eggs were collected. 560 proved infertile, 560 were sent to other Commissions, and 13,255 distributed to clubs and individuals, the birds resulting from these eggs to be distributed locally.

Of the 392 brood stock on hand at the beginning of the laying season 25 were lost, 3 sent away for scientific examination, 361 liberated, and 3 remain on hand November 30.

The station was closed July 31, but, owing to congested conditions at the other stations, the quota of 169 young pheasants from the Marshfield Bird Farm for the 1927 brood stock was taken in August (rather than later in the season) and carried with no expense except for feed. To meet an emergency, 25 of these were shipped to the New Hampshire Commission (birds being returned later in exchange).

The station was re-opened October 19 to winter the 1927 brood stock, consisting of the 3 remaining from the old brood stock, the 144 remaining of the Marshfield quota, 67 from the East Sandwich Bird Farm, 133 from Wilbraham, and 85 from the New Hampshire Commission (25 of which were in return for the shipment previously mentioned, and 60 being reimbursement for birds from the East Sandwich Game Farm). To this stock 13 more were added (10 from an unclaimed allotment of eggs, 2 from wild eggs, 1 raised by a crippled hen from the old brood stock), bringing the total stock on hand to 445. Losses of 17 and 2 escapes left 426 on hand November 30. 400 will be retained as egg-stock and 26 held for spring liberation.

#### *East Sandwich Bird Farm*

In addition to the work done with funds contributed by the clubs, described elsewhere in this report, further construction was done out of the State appropriation as follows. The main construction job of the year was the building of a new brooder house, with a room adjoining to house a heating plant. The work started in the spring, was discontinued during the period of hatching and rearing, and resumed in the fall with the expectation of completing it during the winter months. The building is 15 x 72 ft. (60 ft. for brooding purposes and a 12-foot section to house the furnace below the floor, with feed and storage space above). It will accommodate about 2,000 day-old pheasants for the first two weeks of their lives. There will be the usual covered yards in front of the house, 40 ft. long, and wide enough to correspond with each section of hover inside the house. In line with further additions for brailing yards, another open yard for this purpose was completed late in the fall. It is one-half acre in extent, circular in form, and occupies the upland space north of the winter pheasant houses and the workshop on one side, and the marshes on the opposite side, and well supplied with trees, shrubs, grass and plowed ground.

The year opened with 595 adult pheasants on hand, reduced by losses of 33 and distribution of 30, to 532 at the beginning of the breeding season. 17,062 eggs were collected and set, and 9,558 young birds hatched. 5,481 were lost and 4,077 reared. Of these 1,844 were sent to fish and game clubs for wintering, 856 distributed, 67 sent to the Ayer Game Farm for 1927 egg-stock, 200 to the Wilbraham Game Farm to be wintered for spring liberation, 3 sent away for scientific examination, 1 albino sent to Forest Park, Springfield, 75 shipped to the New Hampshire Commission (in exchange for which they returned 60 to the Ayer Game Farm and 15 later to this station), 205 were distributed as adults, leaving 826 of the 1926-hatched stock on hand the end of the year. To these were added 15 received from the New Hampshire Commission, bringing the total to be wintered to 841. Of these 217 will be added to next year's brood stock, and 624 held for spring liberation.

Of the 532 on hand at the beginning of the breeding season 186 were distributed, 63 lost and 283 remain on hand November 30. These will be held for next year's brood stock.

*Marshfield Bird Farm*

In addition to the work done with funds contributed by the fish and game clubs, described elsewhere in this report, further construction was done out of the State appropriations, consisting of sub-dividing and completing the brooder houses on the hill and the pens opposite them.

The winter of 1925-6 was an unusually hard one in which to care for birds. During the heavy snows and ice storms the snow drifted so high, in some parts of the yards, as to permit the pheasants to walk on it over the fences, and it was necessary to remove the brailed birds from the large pens. They were transferred to pens in front of the large brooder houses, with the houses for runs. Winter lasted so late that the ice and snow still remained in the brood pens when the time arrived to put in the mated birds. The spring was very cold, with the least sun in the early spring months that has been the case for a long time in these parts. This had its effect upon the young birds, for specimens of the young pheasants which died, all showed, according to the report of the Harvard Medical School, a slight, and some a very decided, inflammation of the lungs, "evidently due to climatic conditions" as "no bacterial infection was apparent."

The year opened with the 1,280 adult pheasants on hand recorded in the last report, plus 57 discovered over previous counts. These were reduced by losses of 38, distributions of 426, and brood stock shipped away (103 to Wilbraham, and 220—of which 1 was lost in transit—to Ayer) to 550 by the beginning of the breeding season.

17,331 eggs were collected, 17,199 of which were set and 10,491 birds hatched. There were 6,111 lost, leaving 4,380 birds reared, of which 300 were sent to the Sutton Hatchery to be held for spring liberation, 169 sent to Ayer for 1927 egg-stock, 2,002 distributed to clubs for wintering, 417 liberated in the covers, 576 escaped during experiments with the brail, leaving 916 of the 1926-hatched stock on hand November 30. Of these 42 will be added to next year's brood stock and 874 will be held for spring distribution.

Of the 550 pheasants on hand at the beginning of the breeding season, 42 were lost, leaving 508 on hand of the old stock November 30.

*Wilbraham Game Farm*

During the winter, preparations were made for the next year's activities. In addition to the work done with funds contributed by the fish and game clubs, described elsewhere in this report, further construction was done out of the State appropriation, as follows: Repairs were made to the superintendent's house. The foundation walls were strengthened by concrete piers, and extra supports placed under the floors. Five new windows were added to the west and south side of the house, the ell was resingled, and three ceilings were replaced with sheet rock and wall-board. New wooden bulkheads were built for the house and shop cellars.

A pen for shelter was built inside the large brailing yard. The balance of the wire required to complete the yard was purchased and put on the fence.

There were 1,200 trees planted—Scotch, white and red pine, spruce, and arborvitæ. Considerable green food was planted, but the severe frost of June 17 destroyed the greater part of the first crop. A second planting supplied the green food during the summer, and vegetables for winter feeding.

Because of the disease among the young pheasants in 1925, which may have been caused by bacteria in some of the brood stock and transmitted to the young through the egg, the brood stock was changed entirely as a preventive measure.



The year opened with 571 adult pheasants on hand, which were increased by 103 received from the Marshfield Game Farm, making a total of 674. This number was decreased by 92 distributed prior to the breeding season, and 23 lost, leaving 559 on hand at the beginning of the breeding season.

19,502 eggs were collected, 19,341 of which were set and 6,882 hatched. The failure to obtain a larger hatch was due largely to the defective operation of several large incubators and to the disturbance incident to trucking around the barn. Arrangements were completed to discard these large incubators. Of the birds hatched, 4,417 were lost and 2,465 reared, 2,214 were sent to the fish and game clubs and individuals to be wintered; 1 albino sent to Forest Park, Springfield; 2 sent away for scientific examination; 135 (of which 2 were lost in transit) to the Ayer Game Farm for 1927 egg-stock, reducing the number to 113. To these were added for wintering 200 from the East Sandwich Bird Farm, making a total of 313 1926-hatched pheasants on hand November 30. Forty-three will be added to the brood stock, and 270 held for spring distribution.

Of the 559 adults on hand at the beginning of the breeding season, 39 were lost, 2 escaped and 11 were distributed, leaving 507 adults on hand at the end of the year.

## FISH AND GAME DISTRIBUTION

### FISH DISTRIBUTION

In other parts of this report the problem of fish distribution has been emphasized. (See Inland Fisheries—Trout). The great need for the improvement of this service is a fleet of fast-going trucks, capable of carrying from  $1\frac{3}{4}$  to  $2\frac{1}{2}$  tons, and thoroughly reliable, for break-downs on the road are serious when transporting live fish. These trucks should have specially constructed bodies, and should be rigged with the latest appliances for the handling of the largest possible quantities of live fish.

Each truck should be manned by an experienced fish messenger. The State should be divided up into a certain number of zones and a fish messenger permanently assigned to each one. This for the reason that year after year he will become more fully informed of the physical condition of the ponds and streams in that zone, and thus be able to do increasingly effective work. We are all keenly alive to the splendid work that is being done through the distribution committees of the various clubs, and by individuals in regions not represented by clubs; but we believe that the distribution of fish particularly, and of game, will never be on a solid business basis until thoroughly experienced agents of this Division handle the output direct from the hatcheries to the waters and covers.

The routine of fish distribution was as usual; the total expenditure, \$5,939.77.

Tables showing details of the distributions appear at the end of the section, to which reference is made to supplement the following reports on the various species.

*Brook Trout*.—Egg-planting in brooks was discontinued, as the entire production was required for hatchery operations.

734,255 fingerlings were distributed to public waters from the five hatcheries; 151,300 were sent to the fish and game clubs for rearing and later distribution; and 316,710 fingerlings were held at the stations to be grown to yearlings for spring distribution, pursuant to the present policy of distributing the maximum number of yearlings and the minimum of fingerlings.

The total distribution of yearlings was 110,961 and of adults, 1,089. The distribution of these large fish started after the first of April and



continued through the summer. It is a slow process, for few fish of this size can be carried per can, the number of cans permitted per shipment by rail is limited, very few trucks are available at the hatcheries, and during April many roads were impassable. Many of the clubs co-operated to the fullest extent and materially lightened the work. All of the yearling trout were of legal size, and while undoubtedly many were caught during the open season, probably good numbers escaped to be taken another year as much larger fish.

An experiment in stocking ponds with large trout is under way. It is a fact that very few of our ponds contain trout; but it is believed that good trout fishing can be provided in these waters on the following plan—annually to put extra-large fish into a carefully selected group of ponds. The trout are not expected to reproduce, for it is known that in these big ponds the breeding facilities are limited; and, furthermore, most of the stock planted will be discards from the brood stocks at the hatcheries. This policy has already been followed over a period of years in Peters Pond, Sandwich. This pond contains also black bass, pickerel, and the equally voracious feeder, the Chinook salmon, but the large trout survive and afford very good sport each spring. Nine ponds, one hundred acres or over, either landlocked or with screened outlets, representing different types and involving most of the representative conditions, have been selected for this experiment, namely: Lake Garfield, Monterey; Hampton Pond, Southampton; Hampshire Pond, Westfield; Lake Attitash, Amesbury; Peters Pond, Sandwich; Onota Lake, Pittsfield; Congamond Lakes, Southwick; Baptist Pond, Chelmsford; Lake Archer, Wrentham. The four last-named have not, as yet, been stocked, but this will take place in regular course.

*Brown and Loch Leven Trout.*—After all the brown and Lock Leven stock had been assembled at the Amherst Rearing Station, where in future it is to be handled, a selection of brood stock was made, and the remaining fish were planted in several streams shown, by past experience, to be suitable for them.

*Rainbow Trout.*—No distributions were made, the entire stock of 9,646 rainbow trout fingerlings being retained at the Montague Rearing Station for brood stock.

*Chinook Salmon.*—The Chinook salmon raised at the East Sandwich hatchery were distributed as follows: 14,400 (2-inch) were turned over to the Dighton Fish and Game Club for further rearing and distribution next spring. The 18,000 fingerlings (2½ to 3 inches) reared at the East Sandwich Hatchery were planted in Peters Pond, Sandwich; Ashumet Pond, Falmouth and Mashpee; and Grigson's Pond, Barnstable.

*White Perch.*—The distribution of white perch was again confined to about twenty-five selected ponds. This is the second year that the Division has indicated to the fishermen in what waters the fish should be planted. It is believed that by this plan all white perch ponds in the State will be effectively stocked after a period of years. This year's group comprises: Peters Pond, Sandwich; Richmond Pond, Pittsfield and Richmond; Stockbridge Bowl (Lake Mahkeenac), Stockbridge; Watson Pond, Taunton; Long Pond, Freetown and Lakeville; Shad Factory Reservoir, Rehoboth; Lake Attitash, Amesbury and Merrimack; Flax Pond (Wennehers Lake), Lynn; Hoods Pond, Ipswich and Topsfield; Fosters Pond, Andover; Locks Pond, Leverett; Five Mile Pond, Springfield; Congamond Lakes, Southwick; Hampton Pond, Westfield and Southampton; Greenwich Lake, Greenwich; Norwich Lake, Huntington; Nabnasset Pond, Westford; Mascuppic Lake, Tyngsboro and Dracut; Waban Lake, Wellesley; Houghton Pond, Milton; Lake Pearl, Wrentham; Tispaquin Pond, Middleboro; Robbins Pond, East Bridgewater; College Pond on Myles Standish State Reservation, South Carver; Flints Pond, Grafton, Shrewsbury and Worcester; Shirley Reservoir, Lunenburg and Shirley; Turkey Hill Pond, Paxton and Rutland;

Hardwick or Muddy Pond, Hardwick; Dennison Lake, Winchendon; Rocky Pond, Northboro.

The account of the salvage work by which these white perch were secured, follows.

*Work of the Salvage Unit.*—As in the year previous, a shortage of funds made it necessary to limit the salvage work to the taking of white perch from Tashmoo Pond on Martha's Vineyard. The warden in charge reported early in April that he was getting plenty of fish, but working under difficulties and very trying conditions, for the prevailing heavy winds and low temperatures, accompanied by rains and snow, caused the crew much suffering from exposure to heavy, biting north-west winds, and every morning found the pond and the equipment iced up. Between March 21 and May 1 there were collected and shipped 86,500 white perch (4 to 6 in.).

In June, the gear which had been used for collecting white perch was transferred to Long Pond, Falmouth (a water supply, closed to public fishing) for salvage work requested by the town officials, who paid all expenses. Two wardens performed the work, and collected 1,400 adult small-mouth black bass (10-14 in.) and 600 adult yellow perch (10-14 in.). These were distributed in ponds in Falmouth where public fishing is permitted.

Several small salvage jobs were accomplished, and the fish planted, for the most part, locally:

By wardens: from private pond of William Parkman of Oakham, 350 horned pout yearlings (5-7 in.), shipment of pickerel being given in exchange; from a mud-hole on Fort Hill Farm, Littleton, 20 horned pout yearlings (6-7 in.); from North Watuppa Pond, Fall River, 160 small-mouth black bass adults (10-15 in.).

By John H. Tarment, of the Foxboro Fish and Game Association, from private pond of E. H. Bristol of Foxboro, 660 adult pickerel (averaging 14 in.); 1,515 adult horned pouts (averaging 8 in.); 28,500 horned pout fingerlings ( $1\frac{3}{4}$  in.). The fish were collected, and distributed locally, on the understanding that in future, fingerling and yearling trout of equal value should be turned over to Mr. Bristol, the value of the stock in exchange to be determined by this Division.

*Small-mouth Black Bass.*—The small-mouth black bass distribution was conducted on a plan similar to that for the white perch. A second group of ponds received attention this year, as follows: Spectacle Pond, South Sandwich; Seymours Pond, Harwich and Brewster; Dennis Pond, Yarmouthport; Long Pond, South Yarmouth; Scargo Lake, Dennis; Lake Garfield, Monterey; Clarksburg Reservoir, Clarksburg; Davols Pond, Westport; Sassaquin Pond, New Bedford; Swansea Reservoir, Rehoboth; Chadwick Pond, Haverhill and Boxford; Hoods Pond, Ipswich and Topsfield; Baldpate Pond, Boxford; Ashfield Pond, Ashfield; Moores Pond, Warwick; Congamond Lakes, Southwick; Lake George, Wales, Watershops Pond, Springfield; Nashawannuck Pond, Easthampton; Baptist Pond, Chelmsford; Upper Mystic Lakes, Winchester; Goshen Reservoir, Goshen; Nabnasset Pond, Westford; Lake Walden, Lincoln and Concord; Ponkapoag Pond, Canton and Randolph; Massapoag Lake, Sharon; Lake Archer, Wrentham; Lake Waban, Wellesley; Nippinicket Pond, Bridgewater; Sampsons Pond, Carver; White Island Pond, Wareham and Plymouth; South or Quacumquacit Pond, Brookfield and Sturbridge; Fort Pond, Lancaster; Coes Pond, Worcester. Another series of ponds suitable for bass is now in process of investigation.

*Horned Pout.*—No horned pout were purchased this year, and the entire output consisted of fish purchased last year from the Carter Ponds and held through the winter; the product of the Palmer Hatchery; the fish collected from Stockwell Ponds; and those salvaged in miscellaneous jobs.



*Blue Gills.*—Blue gill stock distributed consisted of yearlings (2½ to 5 inches) collected from the pond at the Palmer Hatchery, together with the output of the Stockwell Ponds.

*Pickereel.*—From the water supply pond at the Palmer Hatchery a number of fingerlings and adults were taken when the pond was drawn down, and distributed, together with those collected from the Stockwell Ponds, and a few small lots.

*Yellow Perch.*—The only yellow perch distributed were those from Stockwell Ponds, and those salvaged in Falmouth.

*Alewife.*—Spawning adult alewives were transported from old breeding grounds or streams in which they were running in good numbers, to the depleted waters listed below: Monponsett Lake, Halifax, 406; Lake Nippenickett, Bridgewater, 1,321; Town River, West Bridgewater (just above the Stanley Iron Works fishway) 201; Town River, West Bridgewater (just above the Jenkins Leatherboard Co., Prattown), 131; total, 2,059.

*Fish Distribution to Public Waters, 1926*

	Product of State Hatcheries	Not Hatch- ery Product (seining, gift, purchase, etc.)
Brook Trout:		
Fingerlings . . . . .	734,255	
Yearlings . . . . .	110,961	
Adults . . . . .	1,089	
Brown Trout and Loch Leven Trout:		
Fingerlings . . . . .	9,025	
Yearlings . . . . .	14,320	
Adults . . . . .	13	
Rainbow Trout:		
Fingerlings . . . . .	250	
Chinook Salmon:		
Fingerlings . . . . .	18,000	
Small-mouth Black Bass:		
Fry . . . . .	137,000	
Fingerlings . . . . .	31,550	
Yearlings . . . . .	650	
Adults . . . . .	8	1,560
Horned Pout:		
Fingerlings . . . . .	104,575	28,500
Yearlings . . . . .	6,325	370
Adults . . . . .	12,082	1,515
Yellow Perch:		
Yearlings . . . . .	19,050	
Adults . . . . .		600
White Perch:		
Adults . . . . .		86,500
Blue Gills:		
Fingerlings . . . . .	134,300	
Yearlings . . . . .	5,375	
Pickereel:		
Fingerlings . . . . .	3,450	
Adults . . . . .	658	660
Alewives:		
Adults . . . . .		2,059
	1,342,936	121,764



*Fish Distributed to Clubs for Rearing to Larger Size Before Liberation*

Trout fingerlings (1½ to 2 inches):		
Worcester County Fish and Game Association	.	75,400
Canton Fish and Game Association	.	25,000
Peabody Fish and Game Association	.	36,500
Chinook Salmon fingerlings (2 inch):		
Dighton Fish and Game Club	.	14,400
		<hr/> 151,300

## GAME DISTRIBUTION

*Pheasants.*—The pheasant eggs distributed to clubs and individuals for hatching were produced at the Ayer Game Farm, from a fine lot of healthy stock, and the sportsmen received from this egg stock the same quality eggs as are used at the other State game farms for producing pheasants.

Many of the recipients of eggs in 1925 succeeded in hatching and rearing, to proper age for liberation, a high percentage of birds from the eggs shipped to them. Of the 12,333 eggs sent out in 1925, there were hatched 4,282 pheasants, of which 1,619 reached the age for liberation. On the whole, the results obtained were disappointing, for the number of birds eventually liberated was extremely low as compared to the expense of maintaining the station which produced the eggs.

The question of discontinuing the distribution of pheasant eggs is now under consideration. It is yet to be decided whether the net result of this work justifies the outlay, or whether an equal amount of money, expended in rearing young birds, would not give more satisfaction in the long run. There are two ways of looking at it—the value proceeding from the birds actually reared, and the stimulation of interest in this work. Undoubtedly some of the clubs have taken on the rearing of pheasants through the winter as an outgrowth of their early interest and experience in hatching pheasant eggs provided by this Division.

The 13,255 pheasant eggs sent out for hatching in 1926 resulted in 6,607 birds hatched, and 2,887 liberated.

Last year saw the beginning of the policy of rearing as many pheasants as possible to maturity before liberation. The game farms carried over from 1925 into this year as many young birds as their plants could accommodate, and the clubs and a few individuals carried through 2,461. These clubs and individuals report 1,555 of that number were liberated in the spring of 1926, and 42 retained for egg-collection and subsequent liberation.

This year the same plan was followed. The game farm accommodations were increased to the extent our funds permitted, but it was necessary to call on the clubs again to take part of the young stock off our hands when from one-third to one-half grown, to make room for the on-coming hatches. When the stations are full to capacity, and new hatches are coming along, they must either be relieved in this way or the stock must be turned loose. This year the clubs came to our assistance by taking off our hands, 6,060 young birds, and it was necessary to distribute as young birds from the East Sandwich and Marshfield Game Farms, nearly 1300 pheasants when quarters became crowded and no local clubs had accommodations ready at the time. Our own stations are carrying over into next spring 2,094, which represents a substantial extension of last year's accomplishment.

Every adult pheasant distributed this year was banded, each farm using a different colored celluloid, copper-mounted band, as follows: Ayer, bright red; East Sandwich, light green; Marshfield, dark blue; Wilbraham, bright pink. The egg-stock liberated from the Ayer Game

Farm last year was banded, and this year the practice was extended to all stations. A card record of each band is kept, with the point of liberation, to which is added (when the band is returned by the gunner to whom the bird falls) the data covering the place and time of capture. In time these records should yield valuable information concerning the movements and history of the liberated birds.

*White Hares.*—The order for white hares placed in Maine was for 2,000. There was again a shortage of hares, and as the trappers experienced great difficulty in obtaining them, our order was by no means filled. December and January were extremely open months, with very little snow, and as it has been the Division's aim to delay distribution of these hares until as near the close of the shooting season as possible, this prevented us from obtaining the full number. The distribution period extended from January 21 to March 31. Only 1,625 were received (of which 696 were imported after the season closed). In future it is planned to start shipments earlier, even though the animals will be exposed to the gunners, rather than to delay shipments until too late to obtain them.

*Cottontail Rabbits.*—217 cottontail rabbits, purchased in Kansas, were distributed. Also 24 which were trapped on Penikese Island and shipped to the Fall River Rod and Gun Club for field trials, were liberated afterwards.

*Miscellaneous Distributions.*—Two adult pheasants confiscated by a warden, and 2 young from a broken-up nest, were liberated; and 1 adult cock pheasant which flew through a window in West Lynn was turned over to the Peabody Fish and Game Association to be wintered.

The cost of game distribution was \$1,229.26.

#### *Game Distribution to the Covers, 1926*

	Product of State Hatcheries	Not Hatchery Product (Pur- chase, gift, etc.)
Pheasants:		
Eggs <sup>1</sup>	— <sup>1</sup>	
Young	1,273	2
Adult	1,313	3
Cottontail Rabbits:		
Adult	24	217
White Hares:		
Adult		1,625
	2,610	1,847

<sup>1</sup> 13,255 pheasant eggs were distributed for hatching and subsequent liberation.

#### *Pheasants Distributed to Clubs to be Reared to Adults for Spring Liberation*

68 fish and game clubs and individuals wintered . . . 6,060

## MARINE FISHERIES

### GENERAL

For several years, through one medium or another, we have been calling attention of the public to the fact that the marine fisheries, one of our oldest industries, have received little or no financial assistance from the State.

This industry stands in a most important relationship, not only to



our own citizens, but to the entire country—in that it is concerned with the production of a very valuable food supply at a reasonable cost.

For many years the State has annually expended substantial sums of money in the interest of agriculture. We fully believe in this policy, and that agriculture deserves all of the consideration which the State, financially or otherwise, can give it. We also feel that the fishing industry, which is likewise concerned with the food supply, should receive a liberal appropriation from funds raised by general taxation.

Among other things the division of Fish Inspection should be enlarged by the addition of more inspectors, with an increased operating allowance for each man. These inspectors stand between the fish producers and distributors, and the fish consuming public. Their activities have resulted in a higher quality of fish passing to the consumer than ever before in our history. It stands between the retailer, who may be tempted to unload an inferior article, and the housewife who may not appreciate the difference in quality. It likewise insures to the retail dealer, fish of increasing quality from the commercial dealer.

The inspection of trips upon arrival at the dock has caused the skippers to take greater pains to properly ice and handle their product while on the fishing grounds, in transit, and unloading. At the present time the inspector and his two deputies cannot possibly cover the entire field. Only three inspections can be made annually of the retail establishments, and in periods of heavy arrivals it is difficult for the force to cover all points.

#### INSPECTION OF FISH

This work is proceeding along the same conservative lines that have marked its good-quality-fish effort since organization in the latter part of 1919. With its limitations definitely laid down by public statute, it offers perhaps little opportunity for bright points that would lift an annual report of its efforts and results above the usual perfunctory level.

And yet this year's story of fish inspection work, the value of which is now admitted and appreciated by fish catcher, fish seller and fish consumer alike, can present features that should be of marked public interest.

The inspector of fish has had under his ken, with his two deputies, during the past year, at least two hundred and fifty million pounds of fish. This is an increase in the amount inspected last year and the pleasing note here is that, with the inspection line drawn as rigidly as is fitting with the "good fish" standard, and practically the same number of inspections, by the same men; it was found necessary to condemn a less number of pounds of fish than during the previous year, the amount for 1925 being 283,500 pounds and for 1926 111,578 pounds. This indicates an increased effort on the part of the fishermen and the fish dealers, both wholesale and retail, to live up to the standard set by law. Of course there are those within the ranks of both the above mentioned classes who might be classed as not in perfect accord with the work and from these sources naturally comes the greater portion of the "poor fish" troubles with which this office has to deal.

Notwithstanding the landings of fresh fish have been the largest in the history of this state, the inspection work has covered a larger part of the total annual catch than ever before.

The force now at the command of this office to handle fish inspection duties is inadequate to meet the work put upon it. The fish landings at Massachusetts ports and the imports of fish to Massachusetts fish centers, both fresh and frozen, have been increasing in the past three or four years. The inspector of fish with only two deputies at his command finds it practically impossible to cover the whole situation as he feels it should be done. The fishermen will be more willing to co-



operate if all trips are inspected. The number of inspections of wholesale and retail plants should be doubled in order to give the public the protection it should receive.

In connection with the effort of many of the wholesale and retail dealers to co-operate with the work of this office, which they unhesitatingly do, as they find it to their advantage so to do, still there are others who possibly honestly desire to live up to the law but from lack of experience or knowledge of how to even conduct a fish market, "fall down" on the job with the result that they find themselves hailed into court. For this reason this office has prepared a pamphlet on "Hints to Dealers" which it proposes to put out to all retail dealers upon application for the same.

### *Court Cases*

Owing to severe storms during the early part of the year, the deputies were handicapped in their inspection work, especially in the central and western part of the State. However, when weather became normal and roads were restored to passable condition, inspections all over the state were resumed; so that every retail store known to this office has received two or three or more inspections during the year. It has not been and it is not now the policy of this office to persecute; rather it is the idea to assist the dealer, to point out to him his mistakes, to condemn what bad fish he has on hand and to give him another chance. If, however, in the course of the work, flagrant cases are observed and persistent violators come to our attention, then there is no hesitation in taking the matter to court. In this way, it is the idea of the office, that the public is safeguarded in its purchase of good fish and at the same time the fishing industry as a whole is not trodden under foot because a few irresponsibles choose the bad way.

### *Inspection at Producing Points*

Inspection at producing points has been done this year as usual, by the inspector himself. The usual ports have been inspected; Gloucester, Boston, New Bedford, Nantucket, Marthas Vineyard, Provincetown, Chatham, Woods Hole, Wareham, and other Cape Cod places. At each of these places conditions were found above the average, except in one or two instances at Provincetown where it seemed to the Inspector that less delay in the landing of whiting at one of the freezers would insure this delicate and easily injured fish being put in frozen condition in much better order if the delay was not so apparent.

### *Work Accomplished*

Inspections in retail stores, 2,219.

Inspections in wholesale stores, 18,361.

Freezer inspections, 336.

Inspections of peddlers' carts, about 300 weekly at Boston Fish Pier.

Inspections at Yarmouth, N. S. steamer, 100.

Vessel inspections at Gloucester, 273.

Vessel inspections at outlying ports, 234.

General inspection trips, 9.

Fish condemned at Boston Fish Pier from vessels, 14,350 pounds.

Fish condemned at Gloucester, direct from vessels, 52,000 pounds.

Fish condemned in retail stores, 3,186 pounds.

Condemned at Fish Pier from consignments on Yarmouth, N. S. steamer; graded as "jellied", 44 swordfish—13,784 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 5,340 pounds smelts.

Condemned, landed at Boston Fish Pier: arrived by rail, 239 pounds scup; 510 pounds bullheads; 35 pounds eels; 2,250 pounds whiting; 271 pounds striped bass; 750 pounds sardine herring; 100 pounds butters; 400 pounds spawn.

Condemned, landed at Boston Fish Pier: graded as "jellied," 78 swordfish—18,363 pounds.

Total amount condemned at Boston Fish Pier and at Boston from Canada by rail and steamer, 56,392 pounds.

Total inspections, 21,532.

Total fish condemned, 111,578 pounds.

Total court cases, 14.

Total convictions, 10.

### *Blackstone Street Fish Market*

This open air market where push cart peddlers have done business on Saturday afternoons and evenings for a great many years, is now carrying a grade of fish which, generally speaking and with some exceptions, marks up to the standard desired by this office. Cart owners or dealers claim they have never before carried such a good grade of fish and listening in to conversations of buyers, who are of the shrewdest sort, confirms that opinion.

This improved condition of affairs has come about perhaps, or possibly, through efforts of this office. For instance, in mid-summer fish were found on several carts in large quantities which not only did not measure up to the quality standard, but were absolutely unfit for food. Fortunately, a deputy inspector was on the scene and promptly not only condemned the goods, but had them destroyed. An investigation by this office showed that the carts on which these fish were found were conducted by men employed during the week on the Boston Fish Pier by Boston Fish Pier concerns. In probing further it was found without question that these unsavory goods came from the Boston Fish Pier, yet the task of proving ownership was so complicated as to prevent this office from taking the matter to court with any hope of favorable decision.

The Inspector of Fish then took recourse by recounting conditions and on August 11th the following letter was sent to the New England Fish Exchange and also to the Boston Fish Bureau. This same letter, on August 18th, was sent to the wholesale fish dealers of Boston, Gloucester and outside ports.

The letter was as follows:

"It often happens that this office, in performing its fish inspection duties, condemns fish at the Blackstone Street market on Saturday afternoons and evenings.

On investigation I find the bulk of these unfit-for-food fish come from the Boston Fish Pier and that some financially interested in carts at Blackstone Street are employed at the Fish Pier.

The point of the above statements is obvious. The Fish Pier cannot afford to have the Blackstone Street market known as an outlet for its unfit-for-food fish that it could not otherwise sell, or would not sell to its regular customers.

The fresh fish business, at present, is being conducted quite generally on a quality basis so it seems too bad that some concerns should allow fish unfit for food to reach the poorer buying class of people through the medium of men who are known to be in the employ of the Fish Pier concerns for years.

I therefore ask your organization to adopt such stringent rules as may prevent in the future any fish of doubtful or unfit-for-food quality reaching the hands of anybody who might sell it for food at Blackstone Street or anywhere else, and to this end I suggest that all poor fish be so cut, hacked, mutilated or severed into small pieces as to preclude its being offered for sale anywhere.



With an expression of appreciation for considerable evidence on your part during the past few years to co-operate, for a good fish standard, with the fish inspection work of the Commonwealth, I remain,

As a fish dealer you are asked to assist in preventing poor quality fish from reaching the Blackstone Street market, Saturday afternoons and evenings, through ANY channel."

It is felt that while these same men are still pursuing their business at the Blackstone Street Market, the letter has had its effect, from the fact that since that date and with the most rigid inspection every Saturday afternoon and evening, no fish unfit for food have been found on any cart; indeed on most occasions the fish offered for sale have been of good quality. So much for going to the fountain head.

### *Work at the Freezing Plants*

The public cold storage plants handling fish have been given many inspections during the year and conditions have been found generally satisfactory. The inspector and his deputies have no jurisdiction over private freezing plants. The office, however, has an oversight of goods going into these freezers, and it can be said that the fish taken into these private freezers has in the main been quite satisfactory and yet by reason of inexcusable delay in handling, some cases have been found where the goods could not be actually condemned as unfit for food, still they approached the border line.

### *General Notes*

Strict watch has been kept on any possible receipts of Japanese frozen halibut in Boston, it having become generally known in the fish trade that some of these fish had arrived at Canadian Pacific ports in a condition which did not appeal to dealers and shippers as first-class. But one doubtful lot was found in Boston and these fish were without question of the second and third grade. Inspection, however, found nothing in the consignment that could be condemned under the state fish inspection laws, but it was a relief to find that the total shipment was quickly and satisfactorily taken care of outside of the state.

Inspections of salmon, especially during the weeks of June 17 and July 4 were made as usual and on the whole the fish were found to be in unusually good order. Frozen smelts from New Brunswick came through in very good shape. This office had, during 1925, to condemn several thousand boxes of these fish and it is taken as indicative of the lesson taught thereby that the smelts this year from Canada, shipped to the Boston consignees, were of no inferior grade. The same remark applies to swordfish from Nova Scotia and Cape Breton. Last year it was necessary to condemn quite a large number of these splendid fish, some weighing from 300 to almost 500 pounds, each fish representing a value at first hand of from \$75 to \$125. When a fish of this size is condemned it means a great loss to the Nova Scotian fisherman who caught it. This year's consignments showed much better care. Pacific halibut shipped to Boston came through generally in good order. Sick or "logy" codfish from the vessels of the fleet landing at the Boston Fish Pier and Gloucester were put under strict inspection and many thousands of pounds were promptly condemned. In this part of the work this office had the help of most of the captains of the fishing vessels and most of the dealers.

The groundfish landed at the Boston Fish Pier this year, taken as a whole, showed an effort on the part of the fish catchers to co-operate with the work of this office to the end that only good fish should be landed and sold. True it is, (as is to be expected) some poor fish reached the market. Doubtless some of these poor fish reached the retail markets and the consumer, but speaking broadly it is safe to



say that the landings of fresh fish at Massachusetts ports for 1926 showed a gradual rise on the quality thermometer, and for this most desired attainment this office has to acknowledge the hearty co-operation of the great majority of the fishermen, captains, vessel owners and fish dealers.

An active part of our work has to do with shipments to Boston of fish from the lake and river districts of the middle west, including the Great Lakes, etc. These consignments total in the vicinity of four million pounds. They are shipped "round"; that is, they are not cleaned or gutted. These fish are for the Jewish people and since the beginning of the work of this office every effort has been made to see that they come through in first-class condition. That inspection has had its effect is evidenced by the fact that out of the four million or more pounds brought into Boston during the year it was necessary to condemn not one pound. The Jewish retail fish dealers buy their fish from day to day for their trade. Nothing is carried over, therefore it is easy to realize just why there is so little trouble in this direction. The answer is, quality.

### *Conclusion*

In last year's report this office mentioned the fact that one of the largest chain store companies operating in this state had declared its intention of selling fresh fish daily at certain of its stores. Because of this it seemed almost certain this action would be duplicated by other chain store factors. This concern alluded to has been handling fish throughout the year in quite a number of its markets and is now intending, as we have been informed, to put fish departments into 172 of its stores throughout the Commonwealth. Another chain of stores has already, within the confines of greater Boston, established fresh fish on counters in 15 stores, with the intention, we are notified, of adding to this list throughout the state as rapidly as locations can be secured.

These chain stores serve a large portion of the people of this Commonwealth and their offerings, the same as those of retail fish markets or wholesale fish markets, should most certainly receive careful inspection. It must be evident that this will entail much more work and therefore more men and maintenance funds are necessary if the character of the work now given by this office is to be maintained. In other words, more men and more money are needed to meet properly the natural increase in the work, caused by increased receipts, increased sales and increased use of Massachusetts caught fish.

### THE DEEP SEA FISHERIES

The deep sea fisheries of Massachusetts for 1926 were pursued with profit and marked by increased landings. The year was a good one viewed from any angle of the industry. More fish were caught, more fares were landed, vessels took shorter time in making their trips, hence a marked rise in the quality thermometer; there was no one particular line of the industry that was depressed to any great extent, while on the other hand, some branches showed such marked increases as to cause most favorable comment and research to the musty tomes of the fabled "good old days" to find the equal—and in some cases the equal was not found.

The winter haddocking fleet enjoyed a most successful season. It may seem strange to say that this success was based on tempestuous weather, which prevailed in several periods during the winter months, thus curtailing the catch, while increasing the danger to the men who brought in the fish, but it is a fact that quicker trips were made, more trips were landed than in the previous season and strange to say the

total at the Boston Fish Pier for the winter fleet varied from the previous year so few pounds as to make it not worth mentioning and also prices held at a higher range throughout the whole winter season.

The summer fresh fishing fleet, as usual, cared for the Boston wholesale fresh fish market in abundant shape. The splitting market at Gloucester was also adequately covered. The vessels fishing for the splitting and curing market, finding that there was no demand for haddock unless these fish could be sold at less than \$1 per hundred weight (which simply precluded their catching), did practically all of their fishing to the eastward, on the Middle Ground, a famous and prolific fishing spot in the vicinity of Sable Island, from whence a largely increased amount of codfish was landed on the Gloucester wharves in a condition which would, in general, challenge the admiration of any food export.

The swordfishing fleet, after meeting with reverses for the past two or three years, came into its own this year, with the result that the catch was almost 85% ahead of last year's figures. In addition to this, the fleet made the largest single day's record ever hung up in this industry, when on July 6 it landed at the Boston Fish Pier 1,531 fish; and it is interesting here to note that every vessel at the Pier had made a very quick trip, none being over 12 days.

Prices averaged for the season higher than ever before in this history of the swordfishery; indeed it seems almost impossible under present conditions to supply the demand of the public for fresh swordfish.

The fresh halibut fleet, aided by many wonderfully large trips during the year and also by a well sustained market which called for high prices from start to finish, fared well. The fleet was not as large as last year and during the season, because of the lure of the mackerel business, was deserted by some of its leaders, nevertheless managed to land only a few hundred thousand pounds less than the fleet did the previous year. Notwithstanding this bright presentation, there is reason for grave concern as to the future of the halibut fishery in Atlantic waters, for the reason that yearly for the past four years there has been a steady and gradual decline in the catch and whatever may be said or done and whatever may be anybody's thought, high prices cannot make up for an evident diminution of supply.

### *The Crisis in the Flounder Industry*

What reached the proportions of a crisis in the flounder fishery and seriously affected a fleet of 50 or more large, high-powered fishing crafts and the fishing business of the port of Nantucket as well, was met and successfully solved and handled by this Division. It was a very serious problem, entailing a possible money loss to shippers, owners and crews of at least half a million dollars.

This office was notified on November 9 that flounders shipped out of Nantucket, or fares caught on Nantucket grounds, were being rejected by the New York buying concerns on the ground that the fish had a strong "carbolic" taste. The notifying letter also stated that so serious was the condition that many of the fishing boats were laid up at the wharves and that what practically amounted to an embargo was on. The letter also requested the sending of a Division man to Nantucket to look over the situation and see what could be done. The matter was promptly attended to and on November 10 the Director ordered the state inspector of fish to take up the whole matter.

A trip to Nantucket showed that the conditions stated in the letter of November 9 had existed for at least four or five weeks. Some 15 or 20 fine fishing crafts were hauled up alongside the wharves of Nantucket lying absolutely idle. A fleet of some one dozen crafts of the same class were fishing for quahaugs on the grounds inside of Great Point, in a laudable effort to "keep going." It can be said here that



these crafts were making good money. Some two or three crafts, also of this fleet, engaged in the scallop fishery, and also were being financially recompensed fairly well for their endeavors.

The Inspector went over the situation with some shippers, fishermen, captains, owners and others who have the welfare of the Nantucket fishery at heart. He found conditions very serious. He found the New York concerns had withdrawn their buyers from Nantucket and when the inspector states that in a previous year he has seen and met some 20 buyers on Nantucket wharves, what this statement really means is obvious.

It appeared that some flounders taken on a certain small piece of fishing ground lying from eight to ten miles east by north from the Pollock Rip Lightship and in from 20 to 22 fathoms of water had been rejected at the New York market because it was claimed by these dealers that the fish had a strong taste when cooked and also a strong "carbolic" smell through the gills when landed.

It can be seen from this that the situation was really one which threatened practically the welfare of the flounder fishery by reason of the fact that 75% of all Massachusetts caught flounders reach the New York market.

Some of the captains and owners complained that fares of fish not taken on the so-called "carbolic" grounds were given returns which stated that the small financial settlements were due to the fact that the fish were taken on this particular piece of fishing ground whereas a matter of fact they were taken many miles from there. This situation, stated as above, is obvious to anyone connected with the fishing industry.

It was at this juncture, after this situation had prevailed from some four to five weeks, that the aid of this Division was invoked. The inspector of fish conferred with fishermen, captains, vessel owners, shippers and other interested parties at Nantucket and before leaving arranged for the shipment, to the Marine Biological Laboratory at Woods Hole and also Dr. Tyzzer of the Department of Comparative Pathology at the Harvard University Medical School, of flounders taken from the so-called "carbolic" grounds and also from grounds supposed (or admitted rather), to be remote from this alleged troublesome location. This plan was carried out by securing one of the flounder fishing crafts to go out and make a trip especially for the purpose. The flounders were iced and shipped in regular Nantucket style, reached their destination in good time and the result was that an exhaustive examination, made by the above named authorities of the contents of each barrel shipped. The matter being one of such grave import to the flounder fishing interests and flounder fishermen in general, it is thought wise to give here the reports in detail which were submitted to this office.

The report of the Biological Laboratory, made in two letters, is as follows. The first letter reads—

"Dr. Allee, a scientist from the University of Chicago, who is doing some investigating here at the Laboratory, for a while, is assisting me in trying to determine the trouble with the flounders.

"We examined some yesterday afternoon and shall finish the others this morning. I am writing you this brief account this morning so that you will get some idea of what we are doing and the next mail doesn't go out until late afternoon. We do not have many mails here a day.

"The fish when received seemed to be in very good condition. The ones that we opened the stomachs contained, to our surprise, hydroids, sea anemones and some forms of bryozoa, not yet wholly determined. In the intestines were beach fleas and other small crustacea.

"There was quite a strong odor in the stomach, more so we think than in the intestines, while the parasitic worms were in the intestines. The odor seemed to come from these macerated or comminuted anemones and hydroids and other small things which they had eaten.



"Dr. Allen and I each took a fillet or steak from two of the flounders which we examined to test out the eating qualities. I found mine very good and Dr. Allee reported the same this morning with the exception that he found one place where it was a little strong and that was where the portion of the fish came from over the viscera or stomach, otherwise he found it all right.

"We each of us also tried eating some fish of the same kind from another locality. This seemed to be a little more tender, otherwise I doubt if I could have told any difference except that the ones you shipped to us were, to say the least, under suspicion.

"This morning early I went to the Laboratory and took two or three steaks from the fish which we had dissected yesterday afternoon taking these steaks from over where the viscera had been, only the viscera had previously been removed, but these had lain on the cement floor over night and it is not to be wondered if they were a little strong.

"They had a slight odor, I would not suggest it being a carbolic odor however. I took these pieces home, washed them, and fried them, and while they were possibly a little strong yet were not unpalatable.

"I also removed the ovary or spawn from one of the flounders which had lain on the floor over night and found it sweet smelling. I also cooked it and ate a part of it and it seemed all right.

"At the present writing there is one suggestion which comes to me that will have to be tried out. It seems to me that if the fish were cleaned, that is what the fishermen call "gutted," in other words, the viscera removed, stomach and intestines, then iced the chances are a great deal of that odor will be eliminated. This should be done immediately after they are caught.

"To my mind there is no question but what it is the food which the flounders seem to be eating at this time and where the fish are iced without being eviscerated there is a chance for this odor from the digested of half digested food to permeate through the fish therefore as a preliminary suggestion I would advise a barrel of fish having their viscera, that is stomach and intestines taken out immediately after being caught then shipped on ice and see if they will not pass muster through the fish markets.

"If there was time and convenience I would say a slight washing out of the cavity where the viscera had lain, would be helpful.

"We hope, however, to have a much fuller and more complete report to send you on this afternoon mail as the investigation of the remaining fish may bring something additional to light.

"Mrs. Gray was cooking codfish for supper when I reached home last evening and I liked the flounder better than I did the codfish and the cooked codfish this morning had a stronger odor than the raw flounder which latter seemed to be sweet and fresh.

Sincerely yours,

(Sgd.) GEORGE M. GRAY,  
Curator."

Mr. Gray's second letter reads as follows:

"Dr. Allee and I have gone through the whole barrel of flounders opening every one and examining the contents of the stomachs and intestines. There were 15 of these which had the tails cut off. Of this lot three or four averaged a little stronger in odor than the others but we consider that even these three or four would under ordinary conditions have passed through the market for food without question. These without exception had the alimentary tract clogged or gorged with hydroids or with mud tubes of worms.

"Such fish might very well develop into an unedible condition if they were allowed to become slightly stale.

"The fact that these fish were under a ban or suspicion would lead some to imagine conditions which an impartial or unbiased person

would not find existed. We tried, in dissecting these, to be impartial or unbiased and we feel that at any other time fish having this same odor would be considered all right and that it was a general fishy odor. We ate of the strongest smelling fish.

"We found that the fish which had gotten rid of most of their sperm and eggs had gorged themselves on hydroids, sea anemones, worms in tubes and some crustacea. Those which were still carrying most of their eggs and sperm had comparatively little food in their alimentary tract and these were less noticeable as to odor.

"Of the fish with tails there were 20 and with few exceptions most of these had eaten nothing and their spermaries and ovaries were very large. The food of those which had eaten consisted largely of sponges, a small percentage of others had eaten small crustacea and one had eaten some hydroids. On the whole there was a decided difference in the food of these fish as compared with the 15. These 20 fish having whole tails averaged a bit smaller but seemed to be in excellent condition.

"If the barrel which we received is a fair sample of what has been going through the markets we would say that in our opinion there has been too much agitation over these. Of course, Dr. Allee and I do not know where or how, or under what conditions this agitation started and it may have been justifiable in the beginning. We of course, are reporting only on the fish which we handled.

"If the agitation still persists the only remedy that we see, at present, is as stated in this morning's letter, for the men to "gut" the fish.

"I might add that as regards the odor of the first lot of fish we obtained almost precisely the same odor by taking some live sea anemones and cutting them up into small pieces.

"If there is any way in which we may be of further assistance we shall be very glad to do what we can and trust you will not hesitate to call upon us."

Dr. Tyzzer's report is as follows:

"On November 16 we received a consignment of flounders packed in a barrel of ice with a tag indicating that those with tails cut off were from Pollock Rip. A number of fish of both sorts were examined at once. The Pollock Rip fish appeared to be healthy and plump with the stomach and intestines distended with food material. Most of the samples were larger than the fish from the other source. The flesh of both types had no bad odor and appeared normal in every respect. On boiling, it was thought that the flesh of the Pollock Rip fish did not have so pronounced a fishy odor as the others. Fish of each group were taken home and after cooking by frying, there appeared to be no disagreeable odor or flavor in either group. When the fish were received, it was thought that the livers of the Pollock Rip fish had a peculiar "brassy" odor that was absent in the others, but after keeping 24 hours, this was just as pronounced in the other group.

"There was great variation in the food taken by different individual fish, the Pollock Rip fish showing in a greater proportion of cases a preponderance of marine worms (Annelides) although some also showed small, bivalved molluscs, and in one the contents consisted almost wholly of a long crustacea. The stomach contents of the other group in most cases showed small sponges, crustacea similar to those found in the Pollock Rip fish, but no marine worms.

"It appears to me that all of these fish as received should be considered as wholesome for food purposes, in fact the Pollock Rip fish appeared better nourished and showed much more food material in stomach and intestines. Assuming that "the customer is always right," it is possible that the group of fish in question may be getting a peculiar type of food, which after the fish have been kept for some time imparts a peculiar flavor. I believe that retail dealers recognize the



fact that certain species of fish when feeding upon certain material spoil much more quickly if they are not gutted at once. It also seems probable that fish in which the stomach and intestines are distended with food material will show what the retailers call "burning" in the region of the nape, a process due to digestion and decomposition in the region of the viscera much more quickly than in fish that are practically empty. This difficulty might be met to a large extent by prompt marketing after careful icing and some provision for gutting the fish as soon as possible after they are taken from the water.

"To summarize, the Pollock Rip fish appear to be normal in every respect but show evidence of much more abundant feeding than the other specimens submitted. Furthermore, there is evidence that they obtain somewhat different food. As received, they have no peculiar odor or flavor, either fresh or after cooking."

These letters were followed by supplementary ones from the same sources affirming that the fish examined by them were in every respect fit for food.

The prompt action of the Division in this matter met with general commendation from the flounder fishermen and boat owners in general and knowledge of what had been done evidently reached New York buying sources, for shortly after the reports were made public, word was received by the Director from Nantucket that it would be unnecessary to go to New York to investigate the situation there as the New York dealers were again buying flounder fares and paying good prices, that some of them had also replaced their buyers at Nantucket and were soliciting anxiously for flounder shipments.

It would seem that work of this kind, done without display or ostentation and yet producing the results, must meet with general approval and it is with no small feeling of pleasure that the Director notes several letters received from leading people in the flounder fishery commenting highly upon the work of the Division.

It should be also noted in this connection that the Woods Hole Station of the United States Bureau of Fisheries, through its superintendent, after having the opportunity of reading the reports of Curator Gray and Dr. Tyzzer, informed this office that the findings of the two men mentioned were amply substantiated by a number of analogous cases where other species of fish were concerned.

#### *Record Year for the Mackerel Fishery*

When the auxiliary powered crafts Orion and Mary A. sailed from Gloucester on Saturday, March 27, their skippers, Captains Dahlmar and Scolla, raised the curtain on what proved to be, in the opinion of this Division, the most successful mackerel fishing season the Massachusetts coast ever experienced. Data of mackerel catches back from 1804 to the present time will confirm this statement.

The two crafts above mentioned sailed to engage in the southern mackerel fishery and so great was the desire of other bright-minded captains to get on the ground early, that in one week twenty had sailed, the total southern fleet numbering over 51 sails. Up to April 8, thirty-nine vessels had sailed as compared with seventeen at the same date in the previous year. The mackerel netters this year also made an early start and quite a number sailed before April 15.

The first mackerel of the season were landed at Cape May on April 11, this being two days earlier than the first landings of last year. There were eleven crafts all arriving within a short time of each other. They brought in a total of 140,000 pounds of mackerel, fresh, weighing from 1 pound to  $2\frac{1}{4}$  pounds, but mostly of the expected size, namely  $1\frac{1}{4}$  pounds to  $1\frac{1}{2}$  pounds. These fish were caught 85 miles south one half east from Cape May. First sales were from 25 to 28 cents per pound.



The southern mackerel season was most successful, the landings being in the neighborhood of 51,000 barrels as compared with the 1925 catch of 24,000 barrels which was considered large. The Cape Shore catch of the fleet, most of which came late, was far ahead of the previous year and the vessels, as soon as they arrived and took out their fares, paid their attention to operations in Massachusetts waters where fish were schooling liberally from Highland Light to Chatham and down in South Channel.

These operations, which began just before the middle of June and which did not cease until the last of November and which were practically confined to waters contiguous to the Massachusetts coast, produced the greatest catch of mackerel in ratio to the number of crafts engaged of which there is any record. Days were frequent when arrivals in Boston and Gloucester totaled from 750,000 to over a million pounds. Many times the market was actually glutted with mackerel; so much so that trip after trip was taken in at the Gloucester wharves and there split and salted. Mackerel were often quoted cheaper than cod and haddock. So great was the inrush that men worked at times all night putting these splendidly conditioned fish under salt. The scene at times on the various wharves at Gloucester can hardly be described. Sufficient to say that every available man who could split a mackerel was pressed into service.

It became usual, day after day, to find both at Boston and Gloucester, most ample receipts of fresh mackerel which naturally made the average price low. During the height of the season the number of vessels engaged reached over 100 sail, which is the largest in recent years. As the season advanced through July, August and September, the same success obtained; hardly without the interruption of a day were great trips landed at the Massachusetts fishing ports and the season ended practically on November 30 with a total catch of 304,385 barrels of fresh mackerel and 5,380 barrels of salted mackerel, a wondrous performance when the number of vessels engaged was concerned.

The Massachusetts catches of fresh and salted mackerel from December 1, 1925, to November 30, 1926, inclusive, and for the corresponding period of the two previous years, were as follows:

	Dec. 1, 1925 to Nov. 30, 1926	Dec. 1, 1924 to Nov. 30, 1925	Dec. 1, 1923 to Nov. 30, 1924
Salt Mackerel (Bbbs.)	5,380	12,442	11,000
Fresh Mackerel (Bbbs.)	304,385	203,961	101,954
	<u>309,765</u>	<u>216,403</u>	<u>112,954</u>

*Cape Shore Catches of Mackerel for Six Years*

Year	Arrivals	Fresh Mackerel (Pounds)	Salt Mackerel (Barrels)
1926	53	2,397,700	1,310
1925	34	1,545,000	1,075
1924	24	996,000	854
1923	31	1,240,680	211
1922	48	1,353,900	2,344
1921	29	2,160,000	3,003

*Cape Cod Activities*

It is not pleasant, but necessary, to record another bad year both as to catch and recompense for the trap fishing industry of Cape Cod. In many cases those engaged in this work did not make a living wage, and

yet to their credit be it said that while the past two seasons have been very discouraging and it has been hard work to keep fishing, still the men in the trap boats, as well as trap owners, expect to be on the job next year and "dig in" harder than ever in the attempt to register a good season. All they desire is for the fish to come into Cape Cod bay.

The situation can be fully sized up, when it is stated that one concern fishing three strings of traps, with fifteen men engaged, the high crew shared only about \$800 to a man and this represents practically labor for ten months of the year. While the traps had such a poor season, the freezers undoubtedly all along the Cape have frozen more fish than the previous year, but the fish taken in were generally of the small price variety and this accounts for the ill-luck of the trap crews. For instance, herring were very plentiful during the months of April and May. Many barrels went direct for bait for the fishing fleet while the rest were frozen and the price was only about \$2 per barrel. There was a fine run of whiting in July, August and September, the take of the traps being so large that after the middle of July the freezers practically cut down on the amount to be taken in daily. But these fish it must be remembered sold at \$1 per barrel. Then again there were plenty of squid in August and September, almost more squid perhaps than the freezers desired and the average price was only \$1.50 per barrel.

What was necessary of course to spell success for the traps was an inrush of mackerel and butterfish and other high priced fish into Cape Cod bay. This did not occur and the catch of these fish was smaller than for many years. It seems odd, in the face of the fact that only a few miles outside of Race Point the greatest season that mackerel seiners ever experienced on the Massachusetts coast was in progress, while the traps were certainly starving for mackerel, yet such was the case. Indeed it is a fact that but one school of mackerel was seined in Cape Cod bay throughout this whole record-breaking mackerel season.

One trap owner operating four weirs reported the largest catch of mackerel landed by his boats in any one day was a meagre ten barrels and at that time the market was so low owing to the glut made by the seiners fares landed at Boston they were obliged to freeze them. Very few mackerel were taken in the traps from June 15 to August 6, so after the squid struck in about August 1st this ended the taking of practically any sizeable amount of food fish in the traps excepting for a few days when some butterfish and plenty of whiting were taken.

The herring catch before alluded to was without question 50% larger than the previous year and this of course helped out a good deal. The whiting catch was good in June and July and the only trouble with the large take of squid appeared to be the fact that frequently they were of such large size as to not be popular with the captains of the fishing vessels who have to use them for bait.

At Barnstable the trap season was very poor and the stock was three-fifths of the last season's which in turn was small.

Very few horse mackerel were taken during the season so it would seem the theory that these fish were inside of the vast schools of mackerel and prevented them from coming into the Bay was, to say the least, not heavily sustained. Yet it does seem to be the general Cape Cod idea that the presence of squid in such large numbers did prevent the influx of food fish into the Bay in any appreciable quantity after August 1st.

Freezers have taken, as above stated, more fish than last year, but nearly all of the frozen product is selling at a very small margin, it was claimed. Nevertheless the freezers should be able to report a profitable year.

It is encouraging to notice that some of the traps during the season took quite a few small bluefish weighing from one to two pounds each



and also one trap at Provincetown on July 8 had a struggle with a young hump back whale which measured 18 feet in length and was finally landed on one of the wharves of the town.

The sea scallop fleet, that is the boats that fished for off-shore deep-water scallops, including crafts from Maine ports and seven from local ports did not fare as well as the previous season, in fact did poorly as a whole.

An interesting feature in the fish business of the Cape is the introduction at one of the freezers at Provincetown of filleting frozen whiting, this being done for a New York concern; the goods being filleted and packed in cartons at Provincetown and shipped to customers to the order of the New York concern. The outcome of this venture will be watched with marked interest. Should it prove successful; with practically no limit in an average year to the possible catch of whiting, it opens up a fish supply source which would meet practically any demand at a reasonable figure and be profitable.

The Provincetown flounder fleet last winter did very well as did some of the smaller crafts engaged in the same line of business during the summer. This fall some 20 of the boats went to Hyannis to fish on the grounds contiguous to that port. This was about October 20. They found the fish quite scarce and mixed in size. So unpromising did the outlook appear to be, that after three weeks of fishing, with very small catches daily to each boat, the crafts departed for the home port and since resuming fishing there have met with good success.

The fleet of mackerel netters that operated from here during the spring including some of the larger crafts did very well and this fall a great many of the boats which engaged in pollock handlining outside the Race met with marked success.

At Chatham the gill netters did not do as well on large mackerel as the year before, but the traps did better. The small mackerel and "blinks" did not come into the Bay at all, but were very plentiful outside. Squid were taken in about the same quantity as last year and brought very good prices. Butterfish were more plentiful than for three or four years, being very large in size and very high in price. Herring and "sardines" were plentiful and there was an abundance of cod in the traps. Lobsters were more plentiful than last year and ran later than usual by two weeks. Quahaug fishers did very well, the clams bringing good prices. Scallops were not as plentiful as last year, but were very high in price. Cod was very cheap during the summer, but steak cod did bring from 8 to 10 cents per pound laid down in New York for a short time.

#### *Nantucket Fisheries*

Despite the fact that at least six weeks were lost in the catching and shipping of flounders from this Island to the New York market from early October to mid-November, it is rather pleasing to note that the total shipments from this port were of practically the same amount, or within 75 barrels of the previous year, this year's shipments being 20,700 barrels as against 20,725. Beside the barreled shipments from here, it is estimated that up to the middle of October at least fully as many fares went through direct to the New York market as did the previous year. This being the case the flounder fishing year, while not met perhaps with as good average prices as during 1925, was far from a failure.

The story of the hold-up of Nantucket flounders at New York is told in detail in another part of this report. It is interesting here to note that while the embargo was on and many crafts were tied up idle at the wharves, some of the enterprising skippers immediately rigged their crafts for quahauging inside of Great Point and as the demand was large and prices good for these bivalves a commensurate recompense



for labor was received. Fully a dozen of the flounder vessels engaged for some time in this line of fishing and two or three of them even went into scalloping with not unsuccessful financial return.

The fishing for fluke or summer flounder was very good during June and July. The prices were low on this fish on account of mackerel being so plenty and cheap. The lobster season here was a very good one. Those who fished inside, or to the westward of the Point, brought in the smaller crustaceans. These latter report hauling up a great many small lobsters from four to five inches long and an increasing amount also of egg-bearing lobsters were noted during the season. A few men participated in the eel fishery during the months of September and October and did well as eels brought good prices when shipped alive. It can be incidented here that two men working together stocked \$900 in the two months.

A good supply of soft clams was noted, but all were used locally and sold readily at \$2.50 per bushel. It is estimated that the take was 700 bushels at least.

It was not possible to get the number of barrels of quahaugs taken in the past year, but the only buyer here states that his take was the same as last year and that on top of this, more were shipped by the diggers individually than the previous year. The season was most remunerative as the prices ranged from \$5 to \$9 per barrel.

The traps had a very poor season indeed, very few fish being taken and there was nothing doing in the mackerel line.

The scallop season began November 1st and up to the time of this report it had undoubtedly been the best season for a long term of years. The fishermen, on account of the weather and the plentitude of these bivalves, were able to go every day and get the legal limit of catch with the exception of three days. The scallops were the largest taken for many years and the prices have ranged from \$3.75 to \$4.50 per gallon, with the greater amount of the catch selling for above the minimum prices. Old fishermen say that this scallop fishery gives every indication of continuing successfully to the end of the season.

### *Buzzards Bay*

The Buzzards Bay fisheries have for years been a very interesting factor in the doings and reports of the Division of Fisheries and Game, therefore we may be pardoned for going into the story of the operations of last year somewhat in detail.

The traps in general had a very successful season, taking considerably more tautog, scup, sea bass and squid and mackerel than last year. No bluefish have been reported in the Bay this year. On the eastern side of the Bay a fleet of ten boats fished continually throughout the summer with hook and line and met with good success. Early in the spring they caught at the head of the Bay large quantities of tautog; along in June, July and August fine catches of large scup, all these fish being shipped through the Woods Hole market.

The quahaug draggers this season are doing very well dredging from about off West Falmouth down as far as Cuttyhunk. The scallop fishermen are also reported to have done very well, the scallops being of large and excellent quality.

The Woods Hole view of the season, which includes of course the commercial view, is to the effect that about the same number of swordfish were landed there as the previous year, but a number of the fares came from Georges bank. As a whole the fishing along the shore was very much poorer than last year, less swordfish and mackerel being taken in these waters. It is the opinion in Woods Hole that due to the low prices on mackerel in Boston where the market was glutted or filled practically all of the season, some of the shore boats here could not afford to operate.

It is encouraging to receive the report that more bass and bull's-eye mackerel have been taken than for at least 15 years. Handlining for scup and bass was also the best for years, although the take of butterfish and squid was not up to the average and the lobster catch appeared to be on the decline.

Another report of great interest and apparently from an authoritative source states that the mackerel fishing in the Bay during the season was very poor, but that 12 fish were taken with rubber bands around their necks and no tagged fish were caught. Less flounders were caught than the previous year, the cod taken were smaller in size and no tagged fish were taken. Very few haddock were landed, but those caught were very large. Squiteague were in very small receipt, those taken being of large size, while more sea bass were caught than all the total of the last 15 years. Those caught in the spring were very small, but ran larger later on in the season. Less bluefish were caught, although the size was larger than usual, ranging from  $3\frac{1}{2}$  to 7 pounds. A big decrease was noticed in the menhaden catch, the same story applying to tautog and alewives. The squid taken were all of the bone variety and the total catch was little above normal.

There was a great increase in the catch of bull's-eye mackerel. Many of these fish were too small for the New York market being from 8 to  $8\frac{1}{4}$  inches long. The wholesale price was as low as \$1.50 per barrel. Less butterfish were taken, but those caught were larger in size. The traps in the Bay were set earlier and the scup ran earlier, some showing before the traps were out. It was a poor year for the traps. About half the usual number of lobsters were taken and these were very small, just over the nine inch measure. A great deal of trouble was experienced with ship worms which came late and stayed late.

At Westport it is noted that more fishermen were engaged than the previous year. Lobsters were not as plentiful, while quahaugs showed a 25% increase, several large beds being found during the last month. There was a decrease of at least 30% in the local taking of clams, while the scallop take was about the same as last year, this statement applying also to oysters. The tautog catch was less than the previous year by about 30%, while mackerel were plentiful in local waters. A great many more codfish were taken in this section, scup showing about the same as last year. There were more eels caught in the local rivers and ponds. The report on sea bass is that there were more fish than last year, although fewer fish were caught for the reason that these marine epicures would not bite any of the baits offered them.

The report from the New Bedford angle is to the effect that the spring and summer mackerel fisheries produced landings of about 1,000 barrels at this port (possibly 75% of which were seined fish) as against a total landing of 1600 barrels during the previous year. It is to be understood that this New Bedford report is a story of the fishing business of the port and not confined to the catch alone made in Buzzards Bay.

A total of 800 swordfish was landed here during the summer as against 1612 for the previous year. This simply shows the failure of the swordfish season on the western grounds, although the swordfish season as a whole was a marked improvement over the previous one. At this port 8 or 10 fish were found to be jellied and were condemned. From the New Bedford point of view the swordfish fishery was little less than a failure. More groundfish and a considerable amount of flounders were landed at this port during the year by the flounder dragging fleet. These landings were made up of small trips or "broken" trips of large crafts. The New Bedford view of the fisheries in Buzzards Bay is as follows:

The year was even worse than last, the traps doing very little. Hand-line fishery in the Bay was also very poor. The traps on the south



shore did catch a few mackerel and scup in the spring, but have been doing very little since. As affecting the New Bedford market and shipments, the traps at Marthas Vineyard did about the same as last year and the New Bedford fish concerns are obliged more and more to depend on fish coming from a greater distance to supply their trade. Scallop takings in the New Bedford area for the season opening October 1st (this report being up to November 1st) are said, by one of the largest concerns, to be at least one half less than last year.

### *Martha's Vineyard*

In general terms the fishing around Marthas Vineyard for the present year sums up as follows: Lobsters—poorest season for ten years. Quahaugs—same as last year or perhaps a little better. Clams—about the same as last year. Scallops—very scarce, the yield being far below last year's catch. Free-swimming fishes—more than last year.

The above paragraph is an introduction to a more complete report of what fishermen of this Island have done during the year 1926. Speaking for the western end of the Island the following statement will be found to cover the situation:

Spring codfishing was rather better than the average, trawlers and handliners bringing in good fares and prices averaged around 3c per pound out of the vessels. The spring spurt of pollock was of too small a run for the market, but the fish were fairly plentiful. There was no large run of scup, but the traps picked up a few right along and with butterfish coming right behind them.

The traps in the Sound did not fare as well as those in the Bay, but in either case it could not be called more than a "fair to good" year. Trap and seine mackerel were more scarce than common. Some of the boats to the eastward however, had some good fishing drailing large mackerel.

Lobstering was the poorest this past season that many fishermen remember. The older fishermen blame the failure to the presence on the ground of vast quantities of codfish, large and small. They claim these fish feeding around the rocks in such large numbers have had a tendency to scare the lobsters sufficient to keep them from potting. Lobster prices did not range as high as last year. The dealers claim the demand was lighter and the average price was about 32c per pound.

Swordfish were again scarce this year on what is known as the "inshore" grounds, although they were fairly plentiful on the banks. The otter trawlers operating for summer flukes did well during the month of June to the southward of the Island. They had only fair luck however in the Sound where they usually do well. Prices paid were from 8 to 12c per pound out of the boat.

Fall codfishing has resulted in large catches, the fish for the most part being rather small and bringing around 3c per pound.

The flounder fleet reports poor prices, this being due partly to the fish running small, but mostly due to the fact that New York dealers claim the offshore fish, for some unknown reason have smelled strong, as of iodine. This knocked the demand and prices flat at New York, the principal market. These so-called affected fish seem to be found only to the eastward of Nantucket and fish from other well-known flounder fishing grounds have not been similarly affected, although the receipt of these so-called "medicated" fish at New York has had a severe effect on the whole flounder market.

The report from the Edgartown end of the Island is as follows: the past season has been the poorest for years for the shore fleet. The run of alewives was fully as large as the preceding year, but the catch was smaller, about 3,000 as against 4,000 barrels. These fish ran so late that a great many went into the pond after the men had quit fishing.



Mackerel were scarce all the year, and flounders were not only scarce, but cheap. A few more swordfish were taken inshore than for the past two years, but not over 100 were landed at this port. No bluefish and but few sea bass were reported as being taken. Scup were fairly plenty from the middle of June to the middle of September and prices were lower than for several years.

Quahaugs were fairly plenty and the prices were about the same as the preceding year. The catch was 5,500 barrels, this amount being a little smaller than the preceding year, this being accounted for by reason of the fact that many of the men who usually engage in quahauging were making more money by taking out sailing parties of summer people during July and August. Scallops were very scarce, but prices were about 40% higher than last year. The only beds around the island are located here and this year, with the small catch, prices hung steadily around \$4 per gallon.

### *Boston Fishing Activities*

It is safe to say that Boston is one of the largest fishing centers of the world. Year by year the fish receipts of this port have been gradually ascending, until at the present time, a statement that fully 225 million pounds of fish are received and distributed from this port is not an exaggeration. Such an amount challenges the admiration of the fisheries world and places the capital of the oldest fishing state in the country on the pedestal on which it truly has a right to stand.

Boston receives its fish mainly from the great fleet which lands daily at the Boston Fish Pier and at the Packet Pier so-called. In addition to this, trains, steamers and trucks bring daily much fish to add to the general total, the scope of its receipts being encompassed only by the great Canadian and American ports of the Pacific, also the Canadian Atlantic ports, and also all ports along the New England and Middle Atlantic coast. Truly Boston is one of the greatest fish ports of the world.

As usual, in speaking of the year at the Boston Fish Pier, which is the largest single fish pier in the world, the State is fortunate in having the opportunity of printing the following resume from the pen of F. F. Dimick, Secretary of the Boston Fish Bureau, whose reputation in the fisheries world is too well known to need comment.

Mr. Dimick says:

"A large volume of business was done on the Boston Fish Pier during the year 1926, and business has been fairly profitable. Competition, however, is very great. The production of groundfish by the fishing fleet was a record one, about 50% of which were haddock. The fillet business, which uses a large quantity of haddock, has continued to expand. The installation of labor saving machinery has aided in the output of fillets.

"Owing to the success of the fishing fleet in the mackerel fishery the amount of mackerel distributed was the largest on record. A large quantity was also put into cold storage. The bulk of the fish landed weighed from 1½ to 2 pounds each, and were of fine quality. Large mackerel, and tinker mackerel were in very light supply, and the fishermen did not see such large bodies of small mackerel on the fishing grounds as for a number of years past.

"The foreign receipts of mackerel declined owing to the low prices that prevailed for fresh mackerel much of the time. After deducting 2c per pound duty and freight charge also, very little was left for the foreign shipper.

"The headline codfishermen which come to this market with codfish principally had a very successful season compared with past years as they landed quite a few large codfish which brought a comparatively good price, and, in the Fall of the year, high prices.

"The catch of fish in the Cape Cod traps has been light except of squid. The Spring catch of herring was good.

"Squid has been very plenty on the fishing grounds the past season, and the fishermen have jigged them in many instances, supplying themselves with bait.

"The business in flounders continues to grow, the fleet landing these fish has increased, and many of the vessels have made good stocks in this branch of fishing. Lemon and gray soles and blackbacks are in lighter supply.

"A larger fleet than usual engaged in the swordfishery, and made good stocks and shares owing to the high prices received for their catch. The total catch of the fleet was 13,994 fish, compared with 8,446 the previous year. The receipt of Canadian swordfish was 100% larger than the previous year.

"Practically no menhaden were caught this year north of Cape Cod."

**Receipts of Fish at Boston Direct from the Fishing Fleet from  
December 1, 1925 to November 30, 1926.**

	Pounds
Large Codfish . . . . .	31,384,778
Market Codfish . . . . .	9,282,793
Cod Scrod . . . . .	102,320
Haddock . . . . .	70,549,563
Scrod Haddock . . . . .	9,829,783
Hake . . . . .	3,213,105
Small Hake . . . . .	1,244,727
Pollock . . . . .	2,674,450
Cusk . . . . .	1,452,000
Halibut . . . . .	2,818,086
Mackerel . . . . .	23,708,292
Swordfish . . . . .	2,378,980
Miscellaneous . . . . .	5,390,500
<b>Total . . . . .</b>	<b>164,029,377</b>

*The Gloucester Fisheries*

While an increase of activity and prosperity are both noted in the fisheries and the fishing business at this port there is a decrease in the landings from the previous year of some eight million pounds. However, sometimes the prosperity of an industry cannot be accurately gauged by the gross receipts and that seems to be the case this year at Gloucester. The facts are that the fishing fleet has done well and the fishing, shipping and curing concerns have each turned in a prosperous year, almost without exception. It is an encouraging fact to note that there is a growing demand for wharf property and buildings and where a few years ago grass seemed destined to grow on some of the wharves along the harbor front, today wharf property is really valuable and very little of it available on the market.

Gloucester, as far as fishing and the fishing industry is concerned, has had a healthy year, one drawback however being the failure of the export business to South Atlantic islands and countries. There has been an increase in business, there has been an increase on the part of the concerns in expanding the scope of their endeavors. More attention is being paid to the canning of fish; also there is a direct and noticeable advance in the matter of producing machinery which will result in bringing to the consumer fish in such shape as to leave no work to be done by the housewife except the cooking.

Many of the vessels of the port have made wonderfully large stocks; many of the crews have shared well; many of the firms, in fact most



of the firms, report a prosperous year; so in spite of the fact that the total catch landings are a little smaller than the previous year, there is no opportunity for any assertion that the business is going back, but on the other hand there is every opportunity for the assertion that, following the local upward trend since 1923, the Gloucester fisheries are not only increasing in worth, but in value.

A scrutiny of the figures showing the landings of the various species of fish at the port for the year closing November 30 shows the outstanding feature to be a very noticeable decline in the receipts of fresh haddock. Whereas in 1925 nearly 15 million pounds of these firm-fibered fish were brought to the port for the purpose of being split and salted, the present year shows receipts of but 8½ million pounds. This decline of over six million pounds in this particular species is accounted for by the slump in and the disturbing conditions in the export market during last spring. Conditions were such in this market that local curers could not pay \$1 per hundred weight for these fish landed fresh and break even on the same goods salted, cured, dried and shipped to southern Atlantic islands and countries. Finding this to be the case, the crafts which annually attended the Gloucester market with capacity fares for splitting and salting, turned their attention to catching codfish, with the result that the receipts of fresh cod showed over a two-million-pound increase, while the receipts of salt cod showed over a million and three-quarter pound increase, this latter pleasant result being due, no doubt, to the insistence of the fish inspection department of this Division that in order to land capacity trips from the eastern banks in proper condition, the first catches of the trip should be salted.

The receipts of pollock were less by over a million pounds, due to the smaller activities of the gill netting fleet.

The increase of over two million pounds in the landing of fresh mackerel is one of the most gratifying factors to mention. Landing all this great amount of fish not only meant the converting of the great bulk of this catch into salted mackerel, but furnished labor for hundreds of men on the various wharves, the rush in this line being so great at times that men worked practically all night at the keelers splitting and salting down the proceeds of one of the greatest mackerel runs in history. Other branches of the industry went along about as usual.

The following tables give the landings of fish at this port from December 1, 1925 to November 30, 1926:

	Pounds
Salt Cod . . . . .	5,788,731
Fresh Cod . . . . .	28,496,158
Halibut . . . . .	48,254
Haddock . . . . .	8,673,051
Hake . . . . .	1,037,070
Cusk . . . . .	586,275
Pollock . . . . .	1,635,720
Flitched Halibut . . . . .	2,860
Not product of American Fisheries . . . . .	7,226,441
Fresh Mackerel (Pounds) . . . . .	8,686,180
Salt Mackerel (Barrelled) . . . . .	3,756
Fresh Herring (Pounds) . . . . .	893,250
Salt Herring (Barrelled) . . . . .	1,461
Salt Bulk Herring (Barrels) . . . . .	17,950
Cured Fish (Quintals) . . . . .	18,789
Miscellaneous (Pounds) . . . . .	2,062,081
Total December 1, 1925 to Nov. 30, 1926—72,414,017 pounds.	

#### SHORE FISHERIES

From the northeast section of the State, which takes in Newburyport, the mouth of the Merrimack River and waters contiguous to Plum



Island and also the flats in these vicinities, the report is that, owing to the enactment of the so-called shellfish law of 1926, Chapter 370, clamming as far north as Salisbury, Newburyport and Newbury diggers are concerned has practically stopped. This includes not only the prohibition of taking clams for food purposes, but also of the taking of clams, mussels and cockles for bait purposes and this action is claimed by the fishermen in this vicinity to affect their fisheries operations to a marked extent, because, in order to catch fish, one must have bait to start with. As to those sections not coming within the contaminated areas in the cities and towns above mentioned, and in Rowley, the clambers seem to have had a prosperous year; even better than last year, and they report an abundance of small clams and spat on most of the flats.

The lobster fishery in this district is declining, and fewer and smaller lobsters are being taken annually. The lobster season this year was an extremely poor one and much fishing gear was lost during the heavy southeaster in September.

The few boats engaged in flounder fishing in this district had a fair season, but not as good as last year. It is encouraging, however, to note that one new craft has just been completed at Amesbury to be used in this line of the fisheries.

There have been no pollock or herring to speak of in these waters this year. About five or six dory trawl and handline fishermen have eked out a fair season's work on cod and haddock. Mackerel were plentiful for several weeks and were taken in goodly numbers on hook and line. These fish weighed from two to three pounds each, and though landed in the best of condition could hardly be disposed of because of the glutted condition of the fish market generally. No boats from this district engaged in netting or seining of mackerel this year.

The sand eel seiners have had a successful year, though not equal to that of last year in catch or catch value. Now that the taking of shellfish from contaminated areas in this district is prohibited, these sand eels form practically the one supply of bait outside of sea worms, for the local commercial fishermen.

The Parker River smelt fishery was an extremely poor one last winter for some unknown reason, although there was a good run of smelt on the spawning ground in the streams in this district last spring. No smelt fishing was attempted in this district until salt water ice made on the streams. It would seem fair to state that the smelt fishery in this district is on the decline.

In the Gloucester district, so-called, the lobster fishery was pursued with fair success as compared with recent years. The total catch should measure up to that of last year, if not a little better. Lobsters were taken in goodly numbers in the early spring and summer, being a little late in shedding, and were fairly plentiful during the fall. Prices ranged a little higher than usual. "Shorts" and "seeders" were about as numerous as usual and this naturally would indicate a fair future for the fishery in this district. The loss of gear, however, in this district was very heavy to those who fished in the outside waters, due to several heavy storms.

Native crab meat is getting to be quite a popular commodity in this vicinity and several fishermen have gone into this fishery in earnest. These crustaceans seem to be quite plentiful as yet, but should the present intensive fishery continue it might be well to consider some conservation protective measure.

Soft clams, the only bivalves taken commercially in this section, are ever increasing in popularity and in consequence thereof the supply is gradually beginning to feel the drain upon it. Without doubt the year just closing has been a banner one for this industry in this locality. More men have been engaged in the business, more clams have been

taken, and prices have ranged higher than last year, and with so many of the flats closed to digging on account of being judged as contaminated, the drain on the unpolluted flats has been much greater. Hence the judgment as expressed above in this paragraph. The towns of Essex and Ipswich, apparently realizing these conditions, have taken some prohibitive measures by closing certain areas for certain seasons of the year. While perhaps the clam proposition, as far as the taking is concerned, is really a city or town affair, still those who have the general oversight of the State's fisheries, should have a watchful eye on the situation and be prepared, if the occasion requires, to enact reasonable prohibitive measures.

The shore fisheries as a whole were less productive than last year, not because of lack of fish, but because the phenomenal run of mackerel caused practically every boat and man that could be secured, to enter this line of fishing. During the winter, however, gill netters did very well, being bothered at times by rather long spells of bad weather, for which high prices compensated in part.

The shore trawlers had a good season. Less herring have been taken along the shore during this summer than usual by the seiners, owing to the more alluring pursuit of mackerel. This fall, however, herring have been very plentiful in Ipswich Bay and in the contiguous rivers, but owing to the fact that the freezers were laden with mackerel the market for this splendid bait fish was practically confined to day-by-day orders of captains and fishing vessels desiring them for bait.

The spring run of alewives was heavy, more having been taken in the Essex stream than for many years. This, probably, is owing to the fact that the town closed the season for two years, thus giving this fish a chance to multiply. At Ipswich quite a lot were observed ascending the fishway for the first time in years, showing that the restocking plan of the Division in this vicinity is proving to be successful.

The absence of butter fish, the scarcity of Old England hake and other school fish, outside of mackerel, had the effect of making the shore fisheries season for the trap fishermen a very poor one, and were it not for the success of the mackerel fishery, as above mentioned, the small boat men would have indeed fared badly; possibly approaching a failure season.

Smelt, while not figured generally as a commercial fish in this district at least, have been unusually scarce in every section. Less smelt have been caught than for many, many years, and the smelt fishermen, good sportsmen generally, are in a quandry as to the cause of the small run of their favorite fish.

Concerning the Lynn and Nahant district, it is pleasing to note that the lobster fishermen have had the best season for many years. Not only were they favored by good catches, but prices averaged above the previous year. The fishermen themselves are encouraged as to the outlook for next season by finding an increase of seed lobsters and many more small and "shorts."

The clam flats in this district are practically within the prohibited area and clams taken from them are, to use a drastic term, "poached." Every effort is made to control this contraband dealing in clams, but it is fair to state that some are still reaching the market. It is simply a point in fact that no man can cover adequately the three mile fishery section limit lying off the coast, the clam flats and the uplands with its game, the brooks and ponds and streams within each over-large designated area, which for lack of more men, the Division finds itself obliged to allocate to each warden.

The gill netters did fairly well and the run of fish was large in size. The absence of haddock, however, is noted by the captains and is a cause of some concern, particularly in the light of the large catches of haddock the year before.



The catches of free-swimming fish were not as large as the year before. Mackerel did not school as close in to the land as they have for some years past. The menhaden or "porgy" seiners came into the Bay as has been their custom for the past several years, but found no fish of the sort they desired. This is of marked importance because for the last three years the porgy seiners, large fleets of big steam powered crafts, have had no difficulty in taking whole cargo loads in these waters in very quick time.

The smelt fishery in Lynn Harbor and adjoining districts was a failure, owing perhaps to dredging operations, but it should be noted also that the failure of the smelt fishery here fits in exactly with the scarcity reports from all along the coast. There is indication here of some of the old-time lobster men taking up crab fishing, as these crustaceans are gaining favor with the fish consuming public and are bringing prices that make it profitable for the fishermen to catch them.

For the district in which is centered Boston Harbor and immediate vicinity the catch of lobsters has shown a slight increase, but during the season the lobster fishermen lost more gear than for years owing to bad storms and winds. The seizure of lobsters (lobsters under Massachusetts legal length) from Nova Scotia and New Brunswick shipments was below the number usually found. This was due to the small catch and correspondingly small shipments from the above named places. The Boston lobster dealers have experienced one of their poorest seasons for years.

The Italian fishermen report their catch of free-swimming fishes as normal.

It should be noted here of course that clams cannot legally be taken from flats of Boston Harbor, this section being closed as a contaminated area by the State Department of Public Health.

Reports for the Plymouth district are to the effect that nearly the whole area of clam flats in this town have been closed by the State Department of Public Health and in the legal digging area around Clarks Island about the usual amount of clams have been taken and the outlook is good for the coming season.

There was a fair catch of mackerel in the traps and some fish were taken by small seiners. The codfish and haddock catches can be termed as average, and there was a good catch of herring, mostly large.

In the Quincy-Cohasset district the marine fisheries for the year resulted in about the same catch as for the past few years with the exception of lobsters, which while the total catch has not been much greater than that of the previous year, still was marked by exceptionally good spring fishing. During the month of March the weekly catch was better than 1,000 pounds per man.

There is practically little or no commercial fishing of the free-swimming fishes in this district, but a great many pleasure fishermen enjoy the sport on the grounds along here and report very satisfactory catches of both cod and haddock. The smelt fishing this year, as in the past few years, was poor. Shellfish areas in this district are all closed because of being within the polluted section, except for a small area at the mouth of the North River and the flats there are depleted.

Reporting for the Cape Cod section to the east of the canal, our advices are to the effect that netting mackerel this season at Monomoy, unlike last year, was a failure. The lobster season was fair, not as many lobsters taken, but the catch bringing higher prices. Trap fishing failed to quite an extent as far as the taking of mackerel and butterfish were concerned, while good catches of herring, whiting and squid were made. Very few mackerel came in, either on the Vineyard Sound side of the Cape or the Cape Cod Bay side. A more extended report of Cape Cod fishing activities will be found under the usual heading.

At Fall River and vicinity very little fishing is carried on. The shell-



fish areas have practically all been condemned by the State Department of Public Health owing to pollution; this edict cutting out the best producing areas in that vicinity. The commercial oyster fishery, in the opinion of the deputy in charge of this district, is now gone altogether.

The lobster season was a poor one, the catch being small in comparison with the past five years, but the fishermen gained some recompense from the fact that prices were good and held fairly steady throughout the season, 40c per pound being the highest wholesale price quoted. The lobster fishermen all practically quit by September 1st, owing to the poor catches.

In all, about 14 boats fished out of Westport and the total catch for the year is estimated at 40,000 pounds. Several of the small boats went into handlining after the lobster season closed. Tautog and cod were the principal fish caught. However, there is no extensive fishing here of the free-swimming fishes and the year's catch could be covered inside of 50 tons.

The scallop fishermen report fair catches. During the year an interesting incident has been the removal of oysters in the polluted areas in the Taunton River. During May and June, George Green of Warren removed 95 hundred bushels of seed oysters and transplanted them into clean waters.

In the Duxbury section the lobster fishermen consider that they did fairly well, not so much by reason of increased catch but because of higher prices on the average than the previous year. No smelting was done this year and no small mackerel were taken to speak of. Some tautog were taken, but speaking generally no regular commercial fishery is carried on from this section.

Reports from the New Bedford district indicates that the lobster season was about normal as for catch, the size averaging about 1½ pounds per lobster and the wholesale prices ranging from 25c the minimum and 35c as top price. Some fishermen report catching numerous lobsters under nine inches and also egg-bearing lobsters and the season closed hereabouts on September 1st.

The quahaug industry seems to flourish in this district and maintained its high average this year, these shellfish being fairly plentiful in the waters of Buzzards Bay. The average price in the wholesale market was about the same as last year.

This has been an exceptional year for scallop taking in the towns of Mattapoisett and Marion. In other towns, such as Fairhaven and Dartmouth, the fishermen made fair catches. The fishermen report no seed so far. The wholesale price on the opening day of the season was \$4 per gallon and since that time dropped but once, when this succulent bivalve product was quoted at \$3.50 per gallon and that only for one week.

There is a small amount of commercial fishing in this district, being confined mostly to the taking of tautog, mackerel, eels, scup, and flat fish by a few small boats.

Summary of the reports of the shore net and pound fisheries as required by Section 148, Chapter 130, G. L.

Number of men engaged, 149; number of boats, 134; value of boats, \$57,323.00; number of fish pounds, 59; value of fish pounds, \$73,912.50; number of nets, 443; value of nets, \$8,620.00; catch in pounds:

Alewives, 147,793

Sea bass, 3,712

Bluefish, 11,071

Sea herring, 20,074

Flounders, 109,896

Shad, 12,583

Mackerel, 647,536

Squeteague, 1,199

Menhaden, 66,637

Striped Bass, 380

Pollock, 17,516

Squid, 1,089,988

Salmon, 178

Tautog, 17,557

Scup, 74,857

Other edible or bait species, 3,797,-

512

Total pounds 6,018,489; total value \$146,869.36.

## THE LOBSTER FISHERY

Replies to questionnaires sent to coast wardens and other authorities bring out the facts, that the number of men engaged in the lobster fishery shows an increase of 64 over the previous year; the catch of lobsters was 85,334 less, while the value also shows a decrease of some \$6,000. Fewer egg-bearing lobsters were returned to the waters than in the previous year by some 2,500 in count. The inquiry, which covered the entire stretch of coastline, shows a wide variance in reports of catch and fishery conditions, being due, without doubt, to the varying weather conditions existing. It is not the intent of this report to go further than to submit the actual statistics, but it would be negligent on our part did we not call attention to the gradual depletion of the Massachusetts catch of lobsters and the fact that the bulk of that catch is at the present time made from the small lobsters.

The Division has proposed certain changes in the lobster laws, calculated to build up the stock, but these have not been backed by the sentiment of the lobster fishermen. Until such time as the fishermen are willing to join in some constructive program that will put the whole industry on a sounder business basis, a further depletion will, in all probability, take place.

During the spring, from shipments from Nova Scotia, New Brunswick and other points outside the State, there were seized at Boston 80 egg-bearing and 12,000 short live lobsters, all of which were distributed on favorable lobster locations along the whole State coast.

The totals of the tabulation of the returns of the year's fishing, required of the lobstermen by law, follow. The period covered is Oct. 20, 1925 to Oct. 20, 1926.

Number of men engaged in the fishery, 571; number of boats, 750; value of boats, \$188,609; number of pots used, 38,942; value of pots, \$103,563.15; number of lobsters taken, 963,477; pounds of lobsters, 1,445,215; value of lobsters, \$391,343.27; number of egg-bearing lobsters taken and returned to the waters, 9,978.

As required by Chapter 130, Section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1926 was 898.

## BOUNTIES ON SEALS

The following towns were reimbursed by the Commonwealth for bounties paid on seals under Chapter 130, General Laws, Section 155: Barnstable, \$6; Chatham, \$4; Duxbury, \$104; Essex, \$12; Gloucester, \$2; Ipswich, \$6; Marion, \$2; Plymouth, \$2; Salisbury, \$4; Yarmouth, \$22; Lynn, \$2; Newburyport, \$8; Rockland, \$2; Revere, \$2; fees to treasurers, \$44.50.

## MOLLUSK FISHERIES

Little that is new can be said of the mollusk fisheries. All available data was collected by the biological department from the diggers and those engaged in the industry, details of which are in the office files. In this general survey, few changes are noted since last year. The outstanding points were the higher prices obtained in the market in 1926, and the fewer clams which were dug.

### *Clam*

On the whole, a fair year was experienced. In many sections it might be termed extremely prosperous, while in others, very poor. The prices obtained for clams were higher than has ever been noted before, but the production, on the whole, was smaller.

Under Chapter 710, Acts of 1912 the clam flats of the town of Essex were leased to the town for ten years from March 24, 1926, and the clam flats in Salisbury leased to that town from May 1, 1926.



In certain localities the industry was greatly affected by the provisions of Chapter 370, Acts of 1926, excluding the public from certain regions where additional flats have been found contaminated, to more excessive digging than would ordinarily occur. It is a question how long some of these unpolluted areas will be able to stand the present volume of fishing.

### *Oyster*

A fairly good season was experienced. The production in Chatham, for example, was considerably smaller than in 1925, although the prices remained the same. It is also interesting to note that, in Barnstable, no oysters were reported as dug in 1925, while this year, 4,000 barrels were obtained which marketed for as high as \$12 per barrel.

In the summer the U. S. Bureau of Fisheries made a preliminary survey of the important oyster grounds on Cape Cod, in order to locate suitable areas for experimental field work in oyster culture next year.

### *Quahaug*

A fair season was reported in most cases by the quahaug diggers. In Wareham, Eastham, Wellfleet and Edgartown a prosperous year was experienced. The production was considerably greater than in 1925, and, on the whole, the prices obtained were considerably higher, bringing, in some instances, as much as \$14.50 per barrel wholesale.

### *Scallop*

A normal year was reported. From fifteen towns, in which scallops were taken, six reported a decidedly prosperous season, and of the remainder the reports run from fair down to comparative scarcity, or poor in several cases. The production in practically all areas was good, and in most cases higher prices were obtained than last year. The scallop beds are said to be in fair condition.

### *Contaminated Shellfish Areas*

The examination by the Department of Public Health of the shellfish areas of the State with respect to the fitness of the shellfish therein for use as food (begun in 1925 under Chapter 300, Acts of 1925) was continued to completion, and this Division received notification of its determination of the contaminated and apparently uncontaminated areas. A complete description of all the areas certified to be contaminated, is too voluminous for inclusion in this report.

The act specified that its provisions should be enforced by the wardens of the fish and game division and other officers authorized to make arrests, but carried no appropriation for the purpose. On the expiration of the period for which the law was enacted—June 1, 1926—the General Court, By Chapter 370, Acts of 1926, continued the powers of the Department of Public Health as set forth in the act of 1925, and provided an appropriation of \$6,000 for this Division for the enforcement of the law. Five wardens, designated as coastal wardens, were appointed, and functioned throughout the remainder of the year, as set forth under Law Enforcement.

### *ALEWIFE AND SHAD*

Chapter 68 of the Acts of 1926 gave the cities and towns along the Taunton Great River the right to lease the alewife and shad fisheries in that river for a term of ten years or more. This was an advisable change, because no person desires to take a lease of these fisheries unless he can have sufficient time, not only to develop the fisheries, but to realize some profit on his investment. This cannot be done unless he can control the fisheries for ten or more years.



Statistics were again collected, wherever possible, on the alewife fisheries. These are on file at the central office. This year's catch of alewives showed a decrease over last year's, 11,151 barrels in 1925 against 10,264 in 1926. From 54 streams, from which data were collected, 8 showed an increase in the catch over 1925, 9 a decrease, and the remaining 37 streams either were not fished, or no information was available. These figures, however, do not necessarily signify that the alewife fisheries in the State are on the decline, for in several instances it is well known that the entire run of fish was permitted to pass to the spawning beds, and on these streams, of course, no figures could be obtained. There were several streams on which seining and fishing rights were not sold this year, and these were the ones, in most cases, where the fish were allowed to run to the spawning beds, although some of the fishermen who did buy rights to fish, appreciated the wisdom of making certain that large numbers of fish reached the spawning grounds, particularly where the right or lease to fish extends over a period of years.

The prices obtained for streams where fishing and seining rights were sold, ranged from as low as \$5 to as high as \$1475.

The sales of alewives caught during the run were obtained and recorded wherever possible. The price for fisheries operated commercially ranged from 50c to \$7.89 per barrel, this price being higher than in 1925.

The work of keeping the coastal streams open for the use of the alewives, and making additional streams accessible to them, is receiving systematic attention, and each year finds a certain amount of progress made beyond the accomplishments of any previous year. This work is fully set forth in the section on Fishways.

The transplanting of adult spawning alewives was continued and plantings made as follows: in Monponsett Lake, Halifax, were planted 406 adult alewives from Pembroke. The result of this planting was most successful, for thousands of young fish 6 inches in length were seen, in October, descending to the sea. In Lake Nippenicket, Bridgewater, were planted 1,321 adult alewives from East Taunton. In the Town River, West Bridgewater (directly above the Stanley Iron Works fishway) were planted 201 adult alewives from East Taunton. The object of this plant was to ascertain whether or not these fish would ascend the Easton Investment Company fishway, at West Bridgewater, the next above. This they were seen to do. In Town River, West Bridgewater (just above the Jenkins Leatherboard Company fishway) were planted 131 adult alewives from East Taunton, to ascertain which way these fish would turn, that is, whether to the Satucket River toward the Carver Cotton Gin Company fishway, or to the Town River toward the Stanley Iron Works fishway. Careful watch was kept, and they were observed in the latter, but not in the former.

Although the total of 2,059 alewives planted this year is less than in other years, good results from them have been reported.

Respectfully submitted,

WILLIAM C. ADAMS,  
*Director.*

## APPENDIX

RECOMMENDATIONS TO BE CONTAINED IN THE SIXTY-FIRST ANNUAL REPORT  
OF THE DIVISION OF FISHERIES AND GAME FOR THE YEAR 1926

The Director respectfully recommends the passage of the following laws:

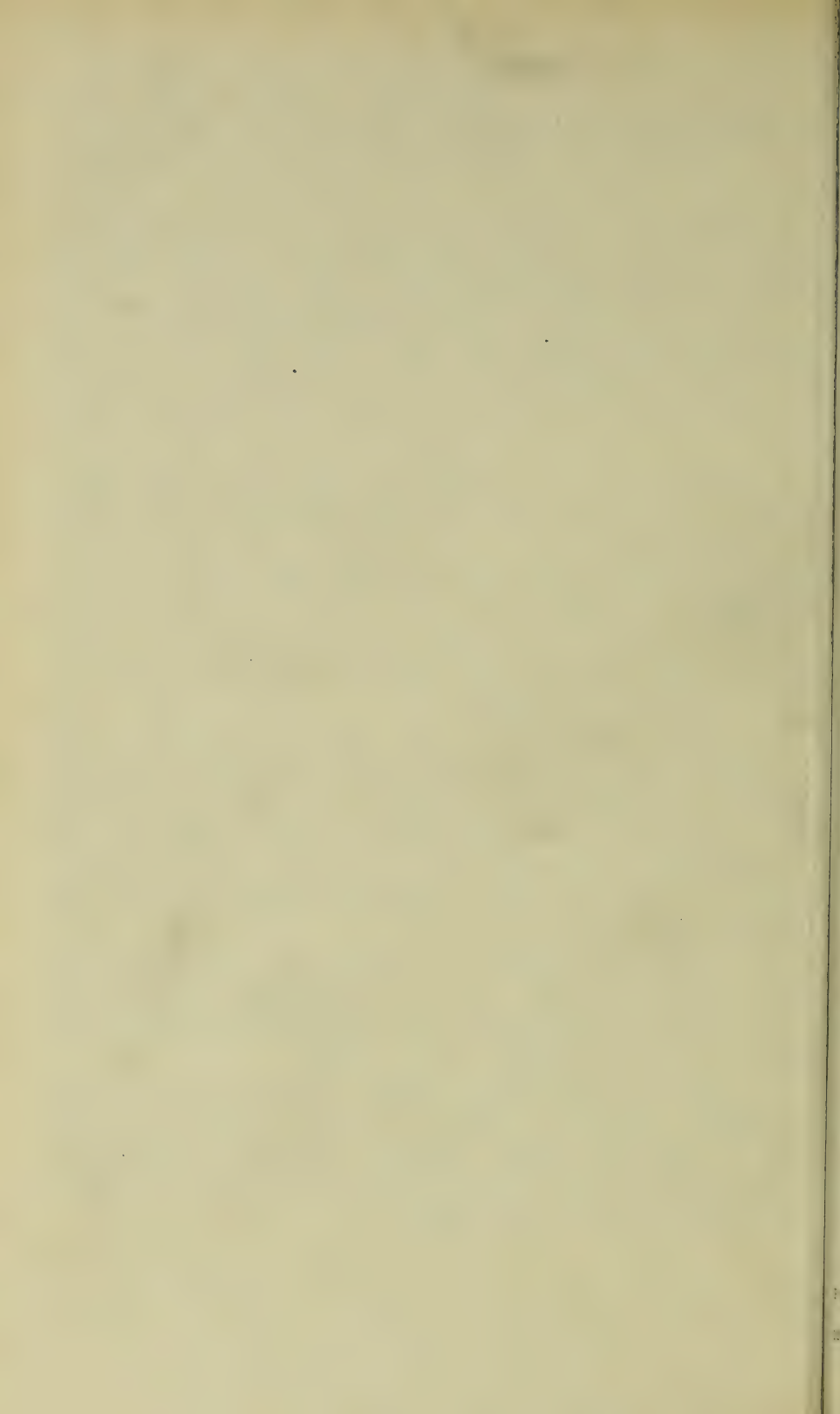
1. *To repeal the Law relative to the training of Hunting Dogs.*—Under the present law dogs may not be trained on any protected species of birds or game between March 1 and September 1. This law does not prohibit the taking of fox hounds into the woods during this time (for the fox is given no protection by law), or other dogs under the guise of hunting unprotected game. It does not restrict the self-hunting mongrel dog which does a great deal of harm to birds and game. No practical scheme can be effected which would tend to keep all dogs out of the woods during the time that game should be unmolested. Therefore, it is unfair to restrict the bird dog and the rabbit hound and allow other dogs, which do more damage than any trained hunting dog, to run at will.

2. *Relative to fishing in Inland Waters.*—Today no license is required to fish in inland waters not stocked subsequent to Jan. 1, 1910. While the greater part of such waters have been so stocked, the law requires the publication yearly of a list of stocked waters at the expense of considerable effort and money for their compilation and publication. If the Commonwealth has expended substantial sums to stock waters prior to January 1, 1910 from which our fishermen are now receiving benefits, there is no logical reason for permitting these waters to be fished without the purchase of a license. This provision has cost the State many hundreds of dollars in loss of revenues from licenses; has made law enforcement difficult; has wrought much confusion among the fishermen, and it should be repealed.

3. *To permit the Department of Conservation to Enlarge Game Farms and Fish Hatcheries.*—It was impossible to see, years ago, the desirability of enlarging some of our fish hatcheries and game farms. It is very possible in the future that desirable improvements at these stations will be blocked by reason of hold-up prices which certain persons owning adjacent lands are now in a position to demand. Therefore, it is important that the Department be given the right to take, by eminent domain, land adjacent to these stations, if such land cannot be purchased at a reasonable price, and if the land is necessary to make any needed improvements and extensions, or to protect the natural resources of the present stations.

4. *Relative to Loch Leven Trout.*—While most people consider the brown and the Loch Leven trout to be one and the same fish, it is desirable to avoid any technicalities and to definitely state in the law that the Loch Leven trout shall receive the same protection as the brown trout now receives. Therefore, we recommend that the law be amended to give the Loch Leven trout specific protection.

5. *Relative to Blue Gills and Sunfish.*—The Division has expended considerable money for the propagation of the blue gill and several ponds throughout the Commonwealth have been stocked with this species with gratifying results. Therefore, a reasonable closed season; a legal minimum length; and a daily catch limit should be provided for blue gills and all other sun-fish, in order that they may have a chance to establish themselves in our waters.





The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1927

*Trans;* DEPARTMENT OF CONSERVATION: *Division of*  
*Fisheries and Game*



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## The Commonwealth of Massachusetts

The Director of Fisheries and Game herewith presents the sixty-second annual report.

### GENERAL CONSIDERATIONS

The education of the public to a proper appreciation of our wild life resources and the intelligent use of them, has long been recognized by conservationists throughout the country to be the greatest single need of this generation. A handful of our youth is now being reached by the larger organizations, particularly the National Association of Audubon Societies, and in scattered schools here and there some teachers manage to work in a little bird study in addition to the regular courses. This country has a representative group of magazines, which, from time to time, discuss some phases of the work, while the press is generous in publishing items of special interest. Here and there a State may issue a bird book or an educational pamphlet or two, and the Federal government is greatly enlarging its series of instructive bulletins. But there is no concerted movement to start with the abc's of conservation of all our natural resources, to be followed by a systematic presentation to our growing youngsters and on through to the grown-ups who now express our national thought.

As a result of this lack of systematic education, beginning with the elementary things and working into the more intricate phases of adjustment and demonstration, widely divergent opinions dominate different classes of our people. The nature-lovers who do not hunt or fish, consciously or unconsciously charge the diminution of our wild life to the hunter and the fisherman. Others believe that wild life can be restored by the simple expedient of setting aside territory upon which no hunting or fishing is to be permitted, and letting it go at that. The average person has no con-



ception of the difficulties of wild life adjustment to all the changing influences set up by what we term civilization. The angler and the hunter are prone to regard with distrust the lovers of the Big Outdoors who do not hunt or fish, and look on them as persons who would prohibit all hunting and fishing if the decision were left to them. But most deplorable is the bald fact that our children are growing up, year after year, without any careful and consistent instruction to enable them to make a proper adjustment to our wild life stock. When this latter state of affairs is called to the attention of the average educator, his reaction is that our curriculums today are already so crowded that there is no place for proper instruction along these lines. Some natural history and some elementary instruction in the sciences may appear in our courses in biology, which can only be enjoyed by a few.

The remedy does not appear to be immediately at hand. The ideal plan would be to start the education of our youth along with the three r's, to be followed through into simple courses in biology in our high schools, and more elaborate instruction in our colleges. There is a real need today for more men of scientific training who will devote their time to research work. Our magazines should more systematically present the question to our people through short and attractively written discussions of one phase after another. Our press should be supplied with informing material, popularly written to pass as news. But in each State, where is the guiding hand to come from to cause all these agencies to work harmoniously? The head of the conservation work in the several States is more or less helpless. Through his annual report he can reach a scattered few. Through the issuance of a limited number of bulletins he can somewhat enlarge the circle. By sending out releases to the newspapers he can include others. But in the aggregate the percentage of the people reached is very small, and the information more or less disconnected and distinctly piecemeal.

The most hopeful sign lies in the fact that increasing numbers of teachers in our common schools are willing to make the effort to arouse interest in our wild life on the part of their students, even though this requires extra work and time on their part. Motion pictures in the homes, the instructive reels exhibited in our motion picture theatres, and the far-reaching radio, are splendid contributors; but the fact remains that our national instruction in wild life conservation is proceeding very slowly, without sequence, and with practically no systematic direction.

To be able to see the wonders of our wild life stock with a knowing eye is a priceless possession. It removes all barriers and places us on an equality. The wood thrush will sing just as sweetly for the pauper as for the king; a great tree will cast its shade on the strong and on the weak without discrimination; the butterfly will come to the humble door as well as to the palace; and the opportunities to go a-hunting and a-fishing are open to us all. Proper adjustment of this wild life stock and a businesslike administration of it, will not only fix the present supply but greatly increase it.

#### PERSONNEL

There were no changes in executive personnel.

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In the office personnel we have to record that W. Raymond Collins, Head Clerk of the Division, and best known throughout the State for his work in the handling of the license system, died on October 19 while on duty in the office. He served faithfully in this Division for twenty-three years, and in many capacities. Much of the system of license, fish hatchery and game farm records and accounting methods were developed by him. His friendly personality, loyalty and enthusiasm for the work made him an ideal public servant.

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## FINANCES

<i>Maintenance</i>	Appropriations	Expenditures	Balances
Salary of the Director	\$4,000	\$4,000.00	—
Services, Office Assistants	10,620	9,936.77	\$683.23
Office Expenses	7,500	7,438.08	61.92
Education and Publicity	1,000	995.55	4.45
Enforcement of Laws:			
Personal Services	62,800	62,193.83	606.17
Expenses	30,000	29,955.68	44.32
Biologists:			
Personal Services	4,710	4,590.00	120.00
Expenses	2,400	2,358.96	41.04
Propagation of Game Birds,	89,000 }		
Animals and Food Fish	2,000 }	90,568.53	431.47
Damages by wild Deer and Moose	9,000	8,999.41	.59
Protection of Wild Life	3,400	3,324.76	75.24
Marine Fisheries:			
Personal Services	9,375	9,112.26	262.74
Expenses	2,600	2,582.00	18.00
Enforcement of Shellfish Laws:			
Personal Services	6,750	6,750.00	—
Expenses	3,600 }		
	1,000 }	4,517.66	82.34
<i>Special Appropriations</i>			
Investigations relative to Shellfish	1,000	939.29	60.71
Improvements and Additions at			
the Fish Hatcheries and			
Game Farms	8,000	7,489.38	510.62*
	<u>\$258,755</u>	<u>\$255,752.16</u>	<u>\$3,002.84</u>
This balance is available for			
use in 1928			510.62*
Amount actually returned to			
Treasury			\$2,492.22**

Balance available from 1926 appropriation for Improvements and Additions at Fish Hatcheries and Game Farms, expended in 1927	\$1,701.52	\$1,696.30	\$5.22
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\*\* It will be noted that the principal portion of this balance returned to the treasury is made up of appropriations for salary increases which remained after the salary increases for the force were announced in November.

## REVENUE

The revenue turned into the State Treasury for the period of the fiscal year was:—for sporting and trapping license fees, \$242,432.50 (see detail below); lobster license fees, \$1,066.75; rent at Palmer Fish Hatchery, \$180; sale of game tags, \$39.20; permits to take shiners and suckers, \$380; lease of clam flats, \$65; lease of Chilmark Pond, \$75; sale of wagon, \$10; sale of fox skin, \$10; sale of bird book, \$5; sale of forfeited muskrat skins, \$22.50; sale of forfeited deer, \$173.10; fines turned into the State Treasury from county treasuries as a result of fish and game law violations, \$10,244; total, \$254,703.05.



*Detail of License Receipts*

	Total Num- ber Issued	Gross Value	Fees to Clerks	Net Return to State
Resident Sporting .	108,746	\$244,678.50	\$27,186.50	\$217,492.00
Resident Trapping	2,555	5,748.75	638.75	5,110.00
Non-resident Sporting (\$5.25) .	1,656	9,954.00	414.00	9,540.00
Non-resident Trapping (\$5.25) .	47	246.75	11.75	235.00
Non-resident Sporting (\$2.25) .	564	1,650.00	141.00	1,509.00
Non-resident Trapping (\$2.25) .	7	15.75	1.75	14.00
Alien Sporting	401	6,115.25	100.25	6,015.00
Alien Trapping	3	45.75	.75	45.00
Minor Trapping	3,583	2,687.25	895.75	1,791.50
Duplicate licenses	1,426	713.00	—	713.00
Lobster licenses	1,255	1,255.00	188.25	1,066.75
	120,243	\$273,110.00	\$29,578.75	\$243,531.25
Deduct on account of pre- vious overpayments .		37.25	5.25	32.00
	120,243	\$273,072.75	\$29,573.50	\$243,499.25

The fact that the revenues from the sporting licenses and fines in the year 1926 exceeded the total appropriations for all of the work of the Division during that year, put us in a position to discuss the financing of the Division from an entirely new angle when discussing the estimates for 1927. That the subject may be more fully understood we point out something of the historical background from the following statement to the public:—

“ANALYSIS OF THE APPROPRIATION FOR THE DIVISION OF  
FISHERIES AND GAME, FOR THE YEAR 1927, IN  
COMPARISON TO THE REVENUES FROM  
SPORTING LICENSES AND FINES  
FOR THE YEAR 1926

“For many years the appropriation to finance the work of the Division of Fisheries and Game was made in about eight subdivisions. For example, Clerical Services, Office Expenses, Director’s Salary, Exhibitions and Publicity, Law-enforcement, Biological Work, Propagation of Game Birds, Fish, etc., and New Construction. When the division for the inspection of salt water fish was established, a further sub-division was added called Marine Fisheries, but it included only appropriations for the Inspector of Fish and his deputies. During those years we carried on various activities, such as the inspection of lobster shipments, the building of fishways, protection of smelt grounds, etc., which were included in the Propagation of Game Birds, etc., sub-division, but should have been included under a Marine Fisheries sub-division, but this was never done by the Budget Commissioner. As a result, we went ahead, year after year, using some of the time of the Director and of the central office force (involving some office expenditures), the biological department and the inland warden force, and drawing on the Propagation fund to cover these activities.

“But in those days the appropriations were nearly double the annual



revenues from licenses and fines, and therefore it was reasonable to suppose that a portion of the appropriation was to be used for these things which were not of direct benefit to those paying in the revenues. From 1922 to 1925 the appropriations were only slightly in excess of the revenues, but during that period we continued to carry on the work in the manner described. In 1926 (when the new sporting license went into effect) the situation was immediately changed, for in that year (for the first time in the State's history) the total revenues from licenses and fines exceeded the entire appropriation for all the work of the Division.

"This result called for a revision of our former practices, and we pointed out to the Budget Commissioner that our appropriation should be reclassified into three separate parts.

"Annually each department must submit to the Budget Commissioner, on or before October 15, estimates of sums which will be required to operate the department in the next fiscal year. Between October 15 and the following second Tuesday in January (when the Legislature annually convenes) the Budget Commissioner, from these estimates, compiles the State Budget. He lays it before the Governor. The Governor makes such changes as to him appear advisable, and he, in turn, presents it to the Legislature. The Legislature refers it to a Joint Ways and Means Committee, and this committee, after hearing heads of departments and others interested, makes such changes as it deems necessary and returns the budget to the Legislature, which enacts it; and when signed by the Governor it becomes the law under which most of the State expenditures are made. This is the procedure in financing the work of the several State departments.

"Therefore, when we came to make up our estimates (in the late summer of 1926) of the cost of operating this Division in 1927, we were certain that the revenues in 1926 would exceed the total appropriation for that year. We saw the time had finally come when we should advocate—that annually a sum be appropriated to do the things of direct benefit to the anglers and hunters who were paying in the revenues—equal to such revenues during the preceding year.

"To bring the facts out clearly we submitted to the Budget Commissioner estimates to cover our work for 1927, divided into three parts.

"Part I included estimates to do the things of direct benefit to the fresh-water angler and hunter. It was most difficult to apportion such items as the salary of the Director, office assistants, etc., and therefore all these things were included in this part.

"Part II contained estimates to cover our work for the non-game birds which is of no direct interest to the angler and hunter as compared to at least a million and a half of our people who do not hunt or fish. In this part we included the cost of maintaining the heath hen reservation on Marthas Vineyard, the wild life sanctuary on Penikese Island, and other items for maintaining wild life sanctuaries, etc.

"In Part III we included all of the work for the marine fisheries, such as the inspection of commercial salt water fish, the maintenance of our coastal warden service of five men (one of whose principal duties is to exclude the public from contaminated clam flats), the lobster work, the construction of fishways and everything having to do with the coastal fisheries. After our estimates were filed we impressed on the Budget Commissioner the fairness of having appropriated, to cover Part I, a sum at least equal to the amount paid in by the fresh-water anglers and hunters in 1926. We also urged that whatever work the Division was authorized to do under Parts II and III should be financed out of funds raised by general taxation, and that under no circumstances should the revenues from the sporting licenses and fines be used as a basis for making appropriations to finance the work grouped in Parts II and III.

"In making up the budget for 1927 the Budget Commissioner followed substantially the three parts of our estimates, but did not make sufficient

appropriations for Parts II and III to finance some of the work which we had carried on for many years, and which we had included in Parts II and III as above set forth.

"The total appropriation for this Division for 1927 was \$259,005. In the following table we show how much of the above total was apportioned, in the budget, to finance the work of each part.

Items in Budget	Part I Fresh-water Angler and Hunter	Part II Non- game Birds, etc.	Part III Marine Fish- eries
Salary of Director	\$4,000	(Item	
Office Assistants	10,620	269 in	
Office Expenses	7,500	budget)	
Publicity	1,000		
Inland Law-enforcement: Salaries	62,800		
Expenses	30,000		
Biological Work: Salaries	4,710		
Expenses	2,400		
Propagation of Fish and Birds	91,000*		
Damages by deer and moose	9,000		
New construction	8,000		
Protection of Wild Life		3,400	
Marine Fisheries:—			
Inspection of commercial salt-water fish:			
Salaries			9,375
Expenses			2,600
Coastal Wardens (to prevent taking of clams from polluted areas):			
Salaries			6,750
Expenses			4,600
Expenses, investigating shellfisheries (C. 33, Res. 1927)			1,000
Bounty on seals			250
<b>TOTALS</b>	<b>\$231,030</b>	<b>3,400</b>	<b>24,575</b>

\* The item of \$91,000 covers the cost of operating the fish hatcheries, game farms, purchase of white hares, collection of white perch, distributing fish (a big item) and game birds, purchase of new stock to change blood lines, and all the miscellaneous items that have to do with the propagation and distribution of fresh-water fish and game, including purchase of trucks to handle the work. Also repairs and replacements at the fish hatcheries and game farms.

"The item of \$9,000 for deer damages has never before been a direct charge against the funds paid in by the anglers and hunters. It has always been paid out of the general funds. The total appropriation of \$231,030 covering the items in Part I, could not all be used for such purposes, due to the following reasons—

"In Part II, 'Non-game Birds, etc.' we had included, in our estimates, among other things, the cost of operating the heath hen reservation on Marthas Vineyard and the sanctuary on Penikese Island. But in the budget it was specified that \$400 of the total of \$3,400 should be used to remove the building from the Henry Cabot Lodge Bird Sanctuary on Egg Rock. The total cost of this job was \$350, leaving a balance of \$3,050 to finance not only the two stations above referred to, but also various other items which we had grouped in this part. The cost of operating the reservation and sanctuary was, roughly, \$5,100. This work could not be abandoned. Therefore we had to use \$1,336 from the Propagation item, \$665 from Biological Work: Expenses, and \$50 from New Construction—all in Part I.

"In Part III, 'Marine Fisheries' we had included estimates to cover the



cost of inspecting all shipments of live lobsters received by our wholesale commission men from Nova Scotia, in order to collect all shorts for planting in our own coastal waters. We received no appropriation for this work. We did not feel that it could be abandoned (although we cut down the volume of it). Therefore we drew again on the 'Propagation' item of \$91,000 in Part I, for \$234 to cover the collection and distribution of such shorts. In the same part we had included the services of inspectors to do this work. But there was no appropriation, and therefore we were compelled to use members of our inland force. Their operating expenses, while on this job, had to be taken from the item 'Inland Law-enforcement: Expenses' in Part I, to the extent of \$218.

"Likewise we had included in Part III estimates for the drawing up of plans for the installation of fishways (for the coastal marine fisheries—alewives—herring), observers of the run of fish in fishways, etc., but no appropriation was made. Here again we did not feel that the work could be entirely stopped, and therefore drew against 'Biological Work: Expenses' in Part I, to the extent of \$503 to finance it.

"To sum up, the following items, this year, had to be financed out of sums appropriated for the things included in Part I of direct benefit to the angler and hunter,—

Damages by Deer and Moose	\$9,000
Non-game Bird Activities (Propagation)	1,336
Non-game Bird Activities (Biological Work: Expenses)	665
Non-game Bird Activities (New Construction)	50
Lobster Work (Propagation)	234
Lobster Work (Inland Law-enforcement, Expenses)	218
Fishways, etc. (Biological Work, Expenses)	503
	<hr/>
	\$12,006

"This total of \$12,006 should, therefore, be deducted from the total \$231,030 which on the above statement would *appear* to be the amount appropriated to do the things of direct benefit to the fresh-water angler and hunter. *The corrected figures show that actually the total should be \$219,024.*

"In 1926 the anglers and hunters caused to be paid into the Treasurer \$236,031.20 as follows:

Licenses (after clerks had retained their fees)	\$225,757.65
Fines collected by wardens	9,890.20
Miscellaneous	383.35
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	\$236,031.20

"Upon comparing this total revenue of 1926 of \$236,031.20 with the total actual appropriation for 1927 of direct benefit to the anglers and hunters who paid in this money (as worked out in the foregoing paragraphs) of \$219,024, it is at once seen that the Legislature of this year has failed by \$17,007.20 to appropriate, for the benefit of the angler and hunter, a sum equal to what they paid in during 1926. Even though the anglers and hunters accept the burden of paying for the damages done by deer out of the funds annually contributed by them, and this sum is deducted from the \$17,007.20 above stated, it still shows that the anglers and hunters contributed, in 1926, \$8,007.20 more than has been appropriated for them in 1927.

"Bear in mind that in this analysis we have charged up to Part I all of the operating costs of the office, salaries and expenses, although, as a matter of fact, a substantial portion of the time of the force and such office expenditures should be charged to Parts II and III. We have made

Note.—While the above figures were compiled prior to a final accounting at the end of the fiscal year, we believe only small revisions will be necessary.



no effort to do this, owing to the great difficulty in attempting any accurate apportionment."

The facts revealed in the foregoing analysis seemed to point the way for a second presentation of the situation to the Budget Commissioner, which was done in the following letter after the estimates for the needs of the Division for the fiscal year 1928 were presented to him on October 15 of this year. This was done in a letter, copy of which follows:

"Boston, Mass., November 28, 1927

Hon. Charles P. Howard,  
Commission on Administration and Finance,  
State House, Boston, Mass.

Dear Commissioner:

"Please refer to our letter of November 29, 1926, giving our reasons for presenting our estimates for 1927 in three parts.

"We are following the same plan for 1928. *Part I, 'Administration of the Central Office, and the Propagation and Protection of Fresh-water Fish and Game,'* includes all the activities of direct benefit to the anglers and hunters. *Part II, 'Non-game Bird Reservations and Wild Life Sanctuaries,'* has to do with our birds and animals deserving protection but not classified as game. *Part III, 'Marine Fisheries,'* includes those activities properly coming under such head.

"We have analyzed the total appropriation for 1927 (as shown on the attached statement)\* to ascertain whether a sum equal to the revenues supplied by the anglers and hunters, together with fines, during the year 1926, was appropriated for the benefit of such anglers and hunters in 1927.

"This analysis shows that, after assuming the payment of damages done by deer (which we claim should not be included as a charge against such revenues), the appropriation for 1927 to do the things of direct benefit to the anglers and hunters *was at least \$8,000 less than the total net receipts from sporting licenses and fines in 1926.* This analysis could be more closely drawn to show that the amount would exceed \$10,000 had we attempted to apportion the Director's salary, the work of the office and operating expenses of the central office and the salaries and expenses of the inland warden force, over all three Parts. But all such were charged against Part I.

"*We have not included in the budget for 1928, any item to cover payments for damages done by deer, for the following reasons—*

"The maintenance of a stock of deer is of great interest, not only to our deer hunters, but also to at least a million and a half of our people who enjoy the out-of-doors but who do not hunt. Hunters have an open season of one week and are limited to the use of a shot-gun. Claims for damage to trees and crops may be collected by land owners. They may kill deer any time during the year. Section 62 of Chapter 131, General Laws, provides,

— "any farmer or other person may, on land owned or occupied by him, or, with the consent of the owner, upon land adjacent thereto, pursue, wound or kill any deer which he has reasonable cause to believe has damaged, or is about to damage crops, fruit or ornamental trees, except grass growing on uncultivated land; and he may authorize any member of his family, or any person employed by him so to pursue, wound or kill a deer under the circumstances above specified."

"They must notify the Division of the killing, but retain the carcass. The value of such carcasses will average \$25. We believe this is a problem of adjustment between agriculture and the wild life stock, and should be considered as part of the State's annual program for the upbuilding of

\* This refers to the "Analysis of the Appropriation for the Division of Fisheries and Game," etc., just preceding.

agriculture. Also these claims should be paid out of funds raised by general taxation, the same as are the other State activities on behalf of agriculture. This would result in the million and a half of our people who enjoy our deer, but do not hunt them, contributing toward their maintenance. Chapter 194, of the Acts of 1927, requires that the Director of this Division approve all claims for damages before payment by the State. We believe that such claims should be investigated by an expert on fruit trees and crops, and that this work should be transferred to the Department of Agriculture or the Massachusetts Agricultural College. At present these investigations take up a substantial amount of time by the Director, the Chief Warden, and the inland warden force, all of which cost is paid by the fresh-water angler and hunter as well as the claims.

"An uncompleted survey shows that there are at least 180,000 acres of lands within the State upon which hunting is prohibited. This does not include all the watershed of the Metropolitan District Commission, or a large number of municipal water supplies, or the one hundred and sixty square miles on which hunting will be prohibited around the Swift River development. For the past three years hunting deer has been prohibited in Essex County. The deer breed in this great area, overflow into agricultural lands, and do damage. Such claims should not be charged against a group of our people who receive no benefit from the existence of such deer.

"At this point we renew our representations of the past several years—that annually there should be appropriated for the work of this Division of direct benefit to the anglers and hunters, a sum at least equal to the total net cash income from sporting licenses and fines of the preceding year. The total income from such licenses in 1927 was \$242,021.50, and from fines (estimated), \$10,400, making the total net income from these two sources for 1927 approximately \$252,421.50. There should be added at least \$8,000 which was not appropriated for this year on the basis of the 1926 revenues. *In other words, there should be appropriated for 1928, to cover the requirements of Part I of our estimates, \$260,421.50, together with an additional sum hereinafter mentioned.*

"Attached hereto is a chart showing the relation between appropriations and revenues of the Division for the ten years 1916-1926. It is interesting to note that in the years 1916-1921, inclusive, the appropriations for the Division were substantially twice the amount of the revenues. Beginning with 1922 the relation between appropriations and revenues remained fixed, with appropriations only slightly in excess of the revenues. In 1926 the revenues from the new sporting licenses and fines exceeded the entire appropriation for all the work of the Division. The appropriations in the chart included all the costs of operating the entire Division and not simply the cost of doing things of direct benefit to those who paid in the money.

"While we believe in the theory that the several divisions of the State government should be as nearly self-supporting as practicable, we feel that care should be exercised to make certain that no injustice is done in the application of it.

"While this Division functions in the interests of all the people of the Commonwealth, only a very small group of our citizens today are contributing toward its maintenance.

"Part I of our estimates includes all the things of direct interest to the group which pays. The work in the other two parts ("Non-game Bird Reservations and Wild Life Sanctuaries" and "Marine Fisheries") are of no more interest to this small group than to the rest of our people. Therefore it is not logical or just that the revenues supplied by this group should be used (or considered as the basis) to finance the work of the other two parts.

"Our anglers and hunters make up a representative cross-section of our tax-payers. After they have paid their proportionate part of the general



taxes, they make a further contribution to the State in the purchase of a sporting license to finance an activity in which they are particularly interested. These funds maintain a warden force which collects additional revenue in fines. It seems only reasonable and fair that annually they should have appropriated for services of direct benefit to them, a sum at least equal to these special revenues which they provided in the preceding year. Furthermore, they should be encouraged to keep this up and to enlarge their special contributions to meet growing demands, by the State setting aside a small portion of the general taxes they annually pay in to be added to the above special revenues to finance this work in which they are specially interested. Last year we suggested a sum equal to ten percent of the total revenues from licenses and fines of the year before. This is an arbitrary amount, not large, but at least sufficient to show that the Commonwealth is ready to help a group of its citizens which is willing to contribute generously for special purposes. *Such an addition of ten percent would make a final total of \$285,663.65 to be appropriated in 1928 to cover the cost of those things included in Part I, 'Administration of Central Office, and the Propagation and Protection of Fresh-water Fish and Game.'*

"The cost of carrying on the work included in Part II, 'Non-game Bird Reservations and Wild Life Sanctuaries' and Part III, 'Marine Fisheries' should be financed out of funds raised by general taxation. This for the reason that they are of direct benefit to either a large portion or the whole of our population. In these parts we included in the estimates for 1927, certain activities which have been a routine part of the work for many years. In Item 269 of this year's budget the sum of \$3,400 was a slight recognition of our new Part II, but this sum was obviously insufficient to carry on our routine work of long standing which we had included in it (i. e. Martha's Vineyard Heath Hen Reservation and Penikese Island Reservation), to say nothing of the other items. The same is true of certain activities included in Part III. Take the lobster work, for example. We were compelled to use some of the appropriations which should have gone entirely to finance Part I of our estimates, in order that we would not abandon these old activities entirely—although we did cut down the volume.

"In making up the budget of this Division for 1928, we earnestly urge that you fit your allocations to these three parts of our estimates as presented. In this way we will be able to ascertain whether or not we are to continue such activities. For example—we have included the operation of the Heath Hen Reservation and Penikese Island under Part II. If we do not receive an appropriation covering Part II at least sufficient to operate both of these stations, we will assume we are expected to restrict this work. Again,—in Part III, 'Marine Fisheries,' we have included estimates to cover all of our work for the lobster industry. If we do not receive a definite appropriation for this purpose we will assume that nothing is to be done in 1928 on behalf of the lobster industry.

"We specifically call your attention to the request for ten additional men in the coastal warden service in Part III. In our estimates we have defined the needs of a coastal warden service as distinct from an inland warden service. We are asking for an enlarged coastal warden service for the enforcement of all laws having to do with the marine fisheries and the exclusion of the public from contaminated shellfish areas. The present force of five men is totally inadequate to enforce this group of laws. The exclusion of the public from contaminated shellfish areas alone can never be done with five men. Today, with this force, we cannot stop the 'boot-legging' of clams from these areas and a real menace to the health of our people exists. It is not logical to expect the inland warden force (which is today maintained by revenues from the anglers and hunters) to devote its time to such enforcement with the resulting decrease in protection to the stock of special concern to those who supply the funds to



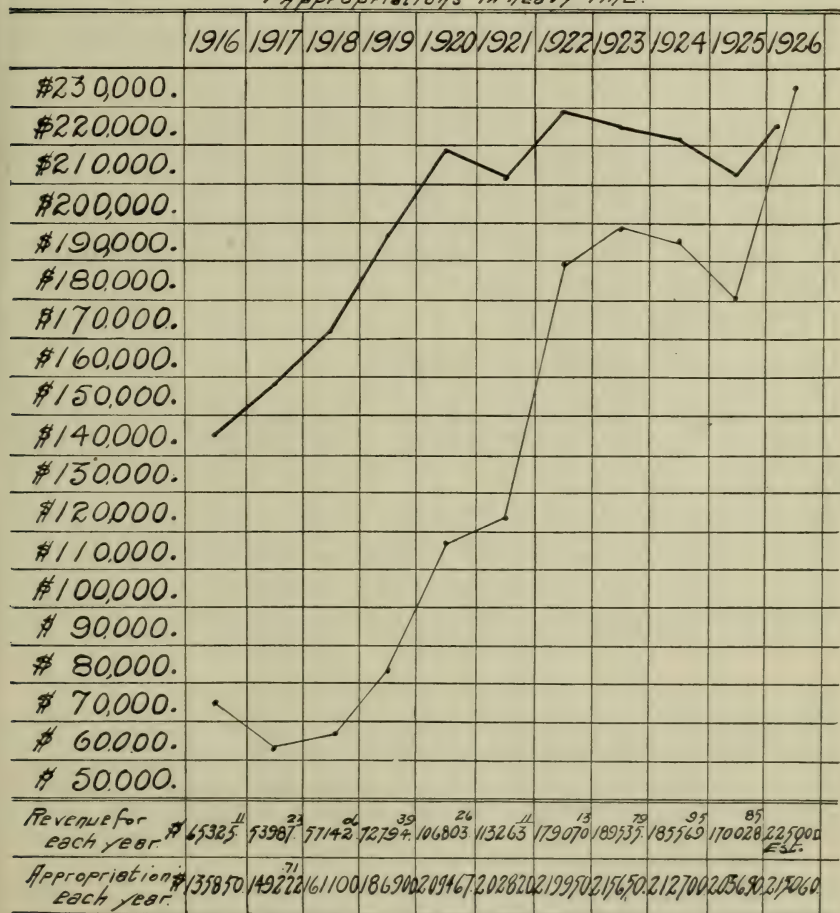
maintain the inland warden force. Therefore, if there is no provision in Part III for 1928 to enlarge the coastal warden force, we will assume that it is the intention of the government for us to do the best we can with our five coastal wardens to enforce the laws relating to the marine fisheries (used as an inclusive term to cover the mollusk fisheries as well) and the provisions of Chapter 370, Acts of 1926, and we will not expect to use our inland force for these purposes.

"If you, as Budget Commissioner, will therefore allocate the appropriations under the three Parts as defined in our estimates, all ambiguity on this point will be removed and we will be greatly aided in formulating our policies in ensuing years.

Yours very truly,

WILLIAM C. ADAMS, Director."

*Appropriations and Revenues 1916 - 1926*  
*Division of Fisheries and Game*  
*Appropriations in heavy line.*



### CONFERENCES WITHIN THE STATE

The regular annual conference with the anglers and hunters and those interested generally in wild life, was held at the State House on December 29, 1926. All parts of the State were represented. The recommendations for legislation by the Division were fully discussed, and in addition, many other matters calculated to better conditions.

The Director attended numerous meetings of the local fish and game associations, bird clubs, and groups interested in wild life, as well as the lobster dealers and groups interested in the shellfish and other commercial fisheries.

### ACTIVITIES OUTSIDE THE STATE

The Director attended the meetings having to do with all phases of wild life conservation, as follows:—

The annual meeting in New York City of the National Game Conference on Dec. 6-7, 1926. At these annual meetings are discussed matters relating principally to the artificial propagation of game quadrupeds and birds throughout the country.

The annual meeting Dec. 8-9 in Washington of the Advisory Board to the United States Bureau of Biological Survey, of which the Director is a member.

The annual meeting of the American Fisheries Society and of the International Association of Game, Fish and Conservation Commissioners, held in Hartford, Conn., Aug. 8-11.

The annual convention of the United States Fisheries Association, held in Boston, on Aug. 12-13.

### ACKNOWLEDGMENTS

In our report for 1926 we recorded contributions (to constitute a building fund for the extension of rearing facilities at the game farms and fish hatcheries) of \$4,608.21 from the clubs, and \$10 from an individual (Dr. Fisher), totalling \$4,618.21. We recorded also the expenditure of \$4,487.23 of this sum during the fiscal years 1925 and 1926.

The balance of \$130.98 was expended during 1927 in finishing pools begun in 1926, as follows:

Montague Fish Hatchery . . . . .	\$69.98
Amherst Rearing Station . . . . .	61.00

This closes the building fund of 1925-6.

In the report for 1926 we recorded also the receipt of \$100 from Lieutenant-Governor Allen for the purchase of land in Sandwich, then held under lease. The details of the purchase were completed during the present fiscal year.

The result of our appeal to the local fish and game clubs in 1925 for funds was so satisfactory all round, and enabled us to make such substantial progress in enlarging the facilities at the game farms and fish hatcheries for producing more matured stock, that we took the liberty of laying before these organizations at other times, projects to be financed from funds contributed by the clubs for certain specific purposes.

### *Stockwell Ponds Fund*

During the past year we called the attention of the clubs in Worcester County and the eastern counties to the need of a large dam across Middle Pond of the Stockwell Ponds Unit. The construction of the dam would place close to 25 acres of additional land under water, and would not only enlarge the producing capacity to this extent, but would permit of raising the height of the water in other sections of the unit. Following are the contributions to this project:—

Beaver Pond Fish and Game Club—of Bellingham . . . . .	\$25.00
Blackstone Valley Fish and Game Club—of Uxbridge . . . . .	25.00

P.D. 25	15
Cape Cod Fish and Game Protective Association	25.00
Clinton Fish and Game Protective Association	25.00
Dighton Fish and Game Club	50.00
Framingham Fish and Game Club	25.00
Grafton Rod and Gun Club	25.00
Hamilton Rod and Gun Club—of Southbridge	50.00
Medway Sportsman Fish and Game Protective Association	25.00
Melrose Fish and Game Club	25.00
Metropolitan Rod and Gun Club, Inc.	22.00
North Grafton Fish, Game and Bird Club	25.00
South Seekonk Gun Club	50.00
Wrentham Fish and Game Club	25.00
	<hr/>
	\$422.00

Of this sum \$405.20 was expended in a partial construction of the dam, leaving a balance of \$16.80. (See Field Propagation—Stockwell Ponds Unit).

#### *Amherst Rearing Station Fund*

At the Amherst Rearing Station we have been carrying under lease, with an option of purchase, the following tracts of land:—from Ernest M. Whitcomb and the Estate of Eugene P. Bartlett, 26 acres containing a larger water supply, suitable for trout culture, than is to be found on the grounds of the present plant; three small tracts, known as the Cowles, Bagdonis and Clark properties, respectively (purchased by Superintendent Louis Horst and leased to the Commonwealth with an option of purchase at the price paid by Mr. Horst), which are needed either to round out our holdings in order to have sufficient ground upon which to build pools to utilize the new water supply, or to protect the watershed. Mr. Horst had also purchased from the Holyoke Street Railway Company the rights previously held by said company to take gravel from lands adjoining the hatchery. It was desirable to acquire these rights for the purpose of clearing the title to one of the tracts of land on the watershed, to give us a necessary supply of sand and gravel, and to provide suitable drainage against flood conditions.

Believing that the local clubs would be interested in contributing funds to purchase these lands, the plan was submitted to the Hampden County clubs and certain clubs in Hampshire County. As a result, the following contributions were received:—

Agawam Sportsmen's Club	\$50
Hampshire County Sportsmen's Club—of Hadley	25
Holland Rod and Gun Club	25
Holyoke Fish and Game Club	50
Leeds Rod and Gun Club	25
Massachusetts Fish and Game Association—of Boston	1,000
Norwottuck Fish and Game Association—of Amherst	100
Paper City Rod and Gun Club—of Holyoke	200
Westfield Rod and Gun Club	50
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	\$1,525

The above contributions have been expended as follows:—

Purchase of the Cowles tract	\$100
Purchase of the Bagdonis tract	175
Purchase of gravel rights	200
	<hr/>
	\$475

It will be noted that the principal tract was that held by Mr. Ernest M. Whitcomb and the heirs of Eugene P. Bartlett, deceased. Messrs.



Whitcomb and Bartlett purchased this land at a cost of \$2,000 when it came on the market unexpectedly, and at a time when the Division had no appropriation with which to make the purchase. In due course it was leased to the Commonwealth with an option of purchase at \$2,000. After Mr. Bartlett's death the Division was advised, through Mr. Whitcomb, that the Estate would be willing to dispose of its interest to the Commonwealth for one-half the cost, or \$500. Mr. Whitcomb signified his willingness to deed over his interest at the same price.

The balance of \$1,050 on hand will be sufficient to purchase the Whitcomb-Bartlett tract (for \$1,000) as soon as the details of the transfer can be completed. There still remains to be purchased the Clark property (for \$350). We believe that in time sufficient contributions will be received to take over this land also.

### *Montague Fish Hatchery Fund*

The Franklin County League of Sportsmen's Clubs has taken a particular interest in the development of the Montague Fish Hatchery. As a result of their efforts, local clubs raised funds toward advancing the construction of large pools at the lower end of the hatchery grounds, to be used in growing increased numbers of trout to year-old fish before distribution. From the contributions made by the local clubs to the League, the officers of the latter paid bills amounting to \$219.39 for blasting the stumps from several acres of land at the lower end of the Montague system. Some of the blasting was to make a new bed for the main brook so that it could be thrown to one side and the present site used for large pools. The League also made a gift to this Division of \$200 in cash from the fund they had raised. This cash contribution was received late in the year, and is being used to complete the removal of the stumps from the area mentioned, to enlarge the bed of the brook, and for preliminary excavations for additional large pools. To the close of the fiscal year \$46.02 has been spent, leaving a balance of \$153.98 on hand.

### *Gifts of Land*

The great permanent value of wild life sanctuaries is beginning to be appreciated throughout the State by our people. This is due largely to the early activities in this field of Dr. John C. Phillips of Wenham (who in 1922 deeded to the Commonwealth the Boxford Sanctuary) and the early activities of the Federation of the Bird Clubs of New England. Later this pioneer work was carried on by the Associated Committees for Wild Life Conservation, made up of representatives of the Federation of the Bird Clubs of New England Inc., the Massachusetts Audubon Society, and the Massachusetts Fish and Game Association.

During the year the following gifts of land to be permanent wild life sanctuaries, have been received:—

From Miss Susan Minns, of Boston, 137 acres on Little Wachusett Mountain, Princeton.

From the Associated Committees for Wild Life Conservation, 39 acres on Watatic Mountain, Ashburnham; 125 acres in East Sandwich (the so-called Hoxie property). (For details, see Sanctuaries.)

### *Other Gifts*

The Federation of the Bird Clubs of New England, Inc. contributed \$100 to assist in removing the buildings from the Isaac Sprague Bird Sanctuary (Carr Island). This was supplemented by a gift of \$50 from Mr. Isaac Sprague. All except a balance of \$1.20 has been expended. (See Sanctuaries.)

The North Shore Rod and Gun Club raised a fund of \$100 (including contributions from Ralph S. Bauer of Lynn and from the Massachusetts Fish and Game Association) to pay the cost of salvaging fish from Wen-

ham Lake for distribution in nearby waters open to fishing. Thus far \$61.58 has been expended, with a balance of \$38.42 on hand.

The Town of Falmouth paid the operating expenses of our salvage crew in trapping fish out of Long Pond (the town's water supply) for planting in open waters.

Frank C. Hatch of Fitchburg contributed \$10 for the purchase of grain for use of the district warden for winter feeding of birds.

The New Bedford Rod and Gun Club raised a fund and purchased a one-ton truck for use at the Sandwich Bird Farm.

The Federation of the Bird Clubs of New England, Inc. turned over to us a second-hand Ford touring car for use by the warden on Martha's Vineyard in law enforcement.

The Springfield Fish and Game Association and the Chicopee Rod and Gun Club were active in the collection of funds to purchase a second-hand Buick touring car for the use of the district warden.

It is impossible to enumerate in detail the countless courtesies and the very substantial assistance in our work, received from individuals and organizations, of which the Division is duly appreciative.

### ENFORCEMENT OF LAW

The law-enforcement policies of the Division were carried forward vigorously during the year with satisfactory results. While the total number of cases did not exceed those of the previous year, yet the more troublesome problems were well handled. During the year it was possible to completely motorize the warden force, thus attaining an end to which we have been working for the past ten years or more. Fourteen new automobiles were purchased and this important accomplishment will undoubtedly result in a more efficient and economical enforcement of the laws in the future.

Only two changes were made in the law-enforcement personnel during the year. Warden Herbert N. Battles of Springfield was granted a leave of absence for one year as of November 30, and Carl D. Nichols of North Adams, a deputy warden for a number of years, was appointed to the regular warden force to succeed him. Miss Irene V. Lydon of the office staff resigned on September 1, and she was replaced by Miss Mary J. Carroll.

Following out the policy inaugurated a year ago, the Chief Warden spent practically his entire time directing the law-enforcement activities in the field in direct supervision of the warden force. This plan has resulted in more team work among the wardens and greater effectiveness in handling our various problems.

By legislative enactment early in the year the Division was charged with the approval of all claims for deer damage filed against the Commonwealth which previously had been paid without investigation by any State official. At the present time no claims are approved by the Division without first having been investigated by a warden, and this plan has already effected the saving of several hundreds of dollars to the Commonwealth. It has been found that in many cases the farmers make no effort to protect their crops or, as the law allows them to do, to kill the deer which come on their farms and do damage. These facts are taken into consideration and have a bearing on the amount of damage awarded. In other cases it has been found that claims have been entered for damage which in reality was caused by other animals than deer. While every effort is made to protect the interests of the farmers, unjust or unscrupulous claims are checked up wherever detected. This is an added responsibility which was placed upon the law-enforcement agency but it was well handled by the wardens during the year without any harmful effects upon the regular patrol work.

Another problem which has required the serious attention of the law-enforcement branch has been the patrol of the contaminated shellfish



areas by the coastal warden force. So serious was this situation at times that the five wardens appointed for the enforcement of this special law were inadequate to handle the job, and it has been necessary at times to employ members of the regular warden force to render assistance. Since this is a problem seriously affecting the public health it has been deemed advisable to follow this procedure to a limited degree. During the year a number of new areas were closed to the digging of shellfish by the State Department of Public Health, increasing the amount of work which had to be done by the coastal warden force, and it is very evident at this time that more men must be added to this force if the public health is to be adequately protected along these lines. The most troublesome areas are those included in Boston, Winthrop, Revere and Lynn where digging continues despite the repeated conviction of the defenders in court. In the prosecution of these cases the defendants have resorted to technicalities in the law which resulted in prolonging the final disposition of many cases in the Superior Court. When the contention of the Commonwealth is finally upheld the wardens will be able to get more prompt dispositions of their cases in court with a corresponding decrease in the number of violations. That the wardens are making considerable progress toward the exclusion of the public from the areas closed to the taking of shellfish is best indicated by the fact that 146 persons were prosecuted under this law and fines totalling \$2,225 were assessed. Although a large number of these cases are now pending on appeals which have been carried to the Supreme Court, the wardens are continuing to arrest and prosecute all persons found on these areas, and in practically every court it is realized that the public health must be protected and suitable penalties imposed.

During the year a new program was put into effect, under which the warden force immediately posted those ponds which were stocked for the first time, thus informing the public that they had come within the class of waters, to fish which a sporting license is required. After a reasonable length of time had elapsed and the public had reasonable notice of the stocking, through the newspapers and by means of the posters, the law was enforced. There is little doubt but that the increase in the amount of revenue from the sporting licenses was due somewhat to this policy, as persons who previously made an effort to evade paying their share of maintaining the sport by fishing only in unstocked waters were this year required to buy a license and thus pay a just part of the divisional expenses.

For the first time since the law was enacted in 1925 his Excellency the Governor was compelled to suspend the fishing season between April 14 and April 23, due to the serious forest fire menace. The Governor exercised his further authority by prohibiting all persons from entering the woods, regardless of their purpose, since this proved to be the only effective way of meeting the crisis, and the warden force patrolled their districts practically night and day to enforce the provisions of the proclamation. Thirty-seven persons were prosecuted for illegally fishing or for unlawfully entering the woods during this period, and many others who unintentionally violated the proclamation were warned of the seriousness of the situation.

Valuable help was rendered during the year by some of the deputy wardens. While the net results accomplished by the deputy warden force (numbering approximately 250), were relatively small, this does not detract from the energetic and earnest service rendered by some members of this branch of the service, despite the fact that they receive no compensation either for their time or expense. It merely indicates that many of the other deputies have either lost interest in the work or are so situated, by reason of regular business endeavors, that



they cannot devote time to law enforcement. To remedy this condition many will fail of reappointment at the end of the year.

The court work for the year was as follows: Number of cases, 1,057; convicted, 971; discharged, 86; (filed, 140, appealed, 47); fines imposed \$15,246; costs paid, \$80. In addition to the penalty imposed by the court, each person convicted loses any sporting or trapping license which may have been issued to him, together with his right to secure a license for one year following date of conviction. Licenses revoked: resident citizen sporting, 134; non-resident sporting, 4; resident trapping, 28; alien sporting, 3; minor trapping, 3; resident lobsterman, 2; alien lobsterman, 1; total, 175.

In the various classes of violation of the fish and game laws the most flagrant is that of fishing without first securing a sporting license. Although the greatest possible warning has been given yearly as to this requirement of the law, a large number of people neglect to purchase a license and others deliberately attempt to evade the law, thus refusing to pay their share of the expense of maintaining the conservation work. Two hundred fifty-two persons were prosecuted under this heading, and in all but 86 cases convictions were obtained and substantial fines imposed. Fines imposed in these cases always greatly exceed the cost of a sporting license, and there is, further, the loss of license. Despite these heavy penalties the law is openly ignored but the warden force is continuing to be vigilant for such violations as the above record indicates.

While a much smaller number of persons were prosecuted for hunting without a sporting license yet 91 were brought before the courts under this charge, indicating that many hunters also tried to violate this well-known provision of the law.

The dangers attendant upon the enforcement of the fish and game laws are again demonstrated by the experience of Warden Carl G. Bates of Warren on October 29. While in the woods at Palmer examining two hunters whom he was about to place under arrest (as they were found to be aliens unlawfully possessing firearms), he was attacked by Anthony Lopes of Chicopee, armed with a loaded shot gun, who warned him to release the prisoners under a threat of death. Being unable to draw his own weapon Warden Bates was forced to withdraw from the scene. However, an immediate and thorough investigation with the very efficient and willing co-operation of the Palmer and Chicopee Police Departments resulted in the apprehension of the offender, who has been held for the Grand Jury charged with an attempt against the life of Warden Bates.

#### NEW LEGISLATION

The following new laws pertaining to fish and game were passed during the legislative session of 1927:

Chapter 5 amended the trout law so that definite protection was given to Loch Leven trout, similar to that given to brown trout. This was necessary due to the introduction of this new species into the State.

Chapter 6 placed a close season on blue gills and sunfish from December 1 to July 1 of the following year; provided a bag limit of forty per day and a minimum length limit of six inches.

Chapter 33 of the Resolves provided for a joint investigation by the Department of Public Health and the Department of Conservation relative to the rendering of shellfish in the contaminated areas safe for food.

Chapter 54 extended for one year the close season on hares in Essex County.

Chapter 60 extended for one year the close season on deer in Essex County.

Chapter 100 pertains to the herring fishery in the town of Yarmouth and authorized the town to grant a long-term lease for the operation of this fishery.

Chapter 142 repealed the law prohibiting the taking of hunting dogs into the woods between March 1 and September 1.

Chapter 174 relative to the fisheries on the Taunton Great River amended the law relative to the maintenance of the fisheries by the towns and cities bordering on the river.

Chapter 194 amended the law relative to the payment of claims for damage caused by deer and moose so that no claim is now paid by the Commonwealth unless it has been approved by the Director of this Division.

Chapter 307 restricted to one bushel the amount of claims which may be taken for family use in the cities and towns in the county of Essex.

## EDUCATION AND PUBLICITY

The main effort along this line was the staging of an exhibit at the New England Sportsmen's Show, from January 29 to February 5, in Mechanics Building, Boston, under the auspices of the Massachusetts Fish and Game Association. This exhibit included a complete set-up of the hatching and rearing of brook trout, from the eyed-out eggs in troughs of running water through all the stages of growth up to maturity. Also a representative group of pheasants was shown. In addition there was an exhibit of illegal apparatus and various devices by which the fish and game laws are violated, with further educational features in connection with law enforcement.

The work of the central office is growing so rapidly that it has been impossible to give as many public lectures and illustrated talks on the work as in previous years. This is particularly true in the case of the Chief Warden, who is now devoting practically his entire time to field work.

The exhibit at the Eastern States Exposition in Springfield was the only one given this year in connection with agricultural fairs, although stock was loaned to 2 organizations for such purposes.

Through releases to the press and special articles we continued to keep the public informed of the work in general.

## BIOLOGICAL DEPARTMENT

### FIELD WORK

Owing to the vigorous campaign of previous years to install fishways, very little along this line was done during the past year. Practically every one of our important coastal streams, except the Neponset and the Charles River, is now open for the run of anadromous fish.

The transplanting of alewives was continued, as well as the collection of statistics on this fishery and on the mollusk fisheries.

More than the usual amount of time was spent on the development and stocking of sanctuaries. The number of requests to visit private estates and advise on methods of increasing wild life denotes a larger public interest and an ever-widening field.

The local fish and game associations are showing greater interest in assisting in the active work of artificial propagation of both fish and game birds, with the result that more time of the biologist has been required for inspections and consultations on such matters.

The usual number of reports of fish dying in widely separated ponds, were investigated.

The biologist had direct charge of the preparation and staging of the exhibit at the Sportmen's Show, which occupied his time over an extended period.

The usual number of trips to the game farms and fish hatcheries were necessary to inspect the stock, and the losses at the Marshfield Bird Farm required special attention. Each year shows an increase in the number of specimens of fish, birds and animals sent in for examination and au-



topsy. The usual amount of photographing of the various phases of the work, was done.

### DISTRIBUTION

The details of the distribution of stock produced at the game farms and fish hatcheries continue to multiply and are taking up an increasing portion of the time of the biological department. The aim of the Division is to distribute equally over the entire State, the stock annually available. This involves careful study of the amount of suitable streams in each county for trout; the amount of suitable cover for white hares, and pheasants; and the pond area of each county for pond fish. These are the considerations on which the distribution of stock is made, and not on the number of applications or the number of local fish and game clubs in a given county. This is the only method by which an equal distribution can be effected. This part of the work is described more fully under Fish and Game distribution.

## WILD BIRDS AND ANIMALS

### WINTER FEEDING

We were fortunate in having a comparatively open winter. Preparation for emergencies was made by the purchase of grain and allowances made to the wardens. There were several brief periods during which we received requests for the distribution of feed, but the shipments were withheld for the reason that we did not consider that the birds were *in extremis*. The grain that we had on hand and bagged ready for emergencies was later on transferred to the Ayer Game Farm.

Owing to our limited funds it is never possible to do more than to meet those grave conditions which occur every so often, when it is a matter of life and death with the birds. Unless they are beset by storms of long duration and great intensity, such species as are common to this State in the winter can adjust themselves to normal conditions. In this direction, as in practically every other, the public is taking a deeper and more sustained interest in helping meet such emergencies, and the State is now fairly well organized to respond on short notice.

### BREEDING SEASON

The effect of the weather conditions on the several species will be touched on in the discussion of each. The spring breeding season started with favorable conditions, but the persistent cold, wet weather continuing through the late spring and summer made the season, as a whole, subnormal.

### FIRES

The extreme drouth of the spring made it necessary to postpone the opening of the trout fishing season from April 15, the usual opening, until April 24. (See Inland Fisheries—Brook Trout). Through the remainder of the year conditions have been normal.

### POSTED LAND

In the discussion of the financial set-up of the Division it was shown that on at least 181,000 acres, hunting is prohibited. This is the first time that any such survey ever has been made, and the figures, even though incomplete, are impressive. However, there is no reason to believe that the posting of land is on the increase. The land owners of the State continue to show a democratic attitude toward the hunter and the fisherman that should be increasingly reciprocated by the latter. When the time comes that the non-land-owning portion of our people will treat the land and other property upon which they are privileged to go, with the same consideration and care that they give their own, many present difficulties will be removed.



## MIGRATORY BIRDS

*Song and Insectivorous Birds*

The policy of issuing permits for the collection of birds, eggs and nests for scientific purposes was changed this year. Heretofore such permits have been issued annually. They are now issued to be effective until revoked, though an annual report from each holder is still required. Seventy-two permits were issued. On the basis of the reports (of which 69 were received) 334 birds and 645 eggs were taken.

We have continued to give to the song, insectivorous and other desirable non-game birds, equal care and protection to that given the game birds. This we continue to regard as one of the greatest obligations of the Division.

*Migratory Game Birds*

*Shore Birds.*—Under rules and regulations of the U. S. Department of Agriculture a close season for two years has become effective on all shore birds.

*Plover.*—The status of the golden plover, upland plover and the piping plover remains unchanged.

*Snipe.*—The spring migration was normal. The fall migration offered less opportunity for sport than usual. Ordinarily much of our snipe country is dry in the fall, with the result that the birds do not stop. This year the opposite conditions obtained—there was so much water on many of the snipe grounds that the birds passed on. There was a lighter fall flight than has been noticed for several years.

*Woodcock.*—There was the usual number of breeding birds in the localities where they ordinarily breed. While the summer was cold and wet there was no indication that it affected these birds adversely.

The fall flight was heavier and more widely scattered than usual. From all indications there were more woodcock on the fall migration, taking the State as a whole, than in recent years.

*Rails.*—Owing to the absence of any open season on shore birds, more than usual attention was paid to rails, for the reason that the season opened on September 1, thus affording some gunners the opportunity to go afield before the opening of the duck season on September 16. We believe that the rail season should open at the same time as the duck season, and have so advised the Federal authorities.

*Sandpipers.*—These birds are distinctly on the increase, as judged from the large flocks reported during the summer migration.

*Winter and Summer Yellow-legs.*—There has been a noticeable increase in the spring flight of both species, but the summer and fall migration has shown little or no corresponding increase.

*Curlew.*—There was a slight increase, which would bring them back to the status of two years ago.

*Ducks.*—The wood duck is slowly on the increase, but the steady building up of the regions which are its natural summer home is gradually forcing it out of various localities.

More mallards were taken during the year than usual.

The spring flight of red heads was normal. The same applies to blue bills. On the return migration more of such ducks have been reported than last year.

The black duck continues to hold its own. We renew our statement of previous years that this bird can be very substantially increased when we are in possession of permanent sanctuaries that are particularly adapted to it.

More than the usual number of canvasbacks were noted during the fall migration.

*Geese.*—From December 1, 1926 to the close of the season the movement of geese was fairly light as compared to the conditions over the past five years.

The spring flight was without special incident.

The fall flight was light up to the close of this report (November 30).

Extraordinary weather conditions have prevailed during the past two or three years, that may or may not have been a factor in the migration of geese. At any rate, the flight has been light during the early part of each open season.

The spring flight of brant was of the usual proportions. Up to the latter part of November the brant had appeared in only very small numbers along the coast, with the usual concentration in Vineyard Sound in that district between Tuckernuck, Muskeget and Nantucket.

*Statistics of the Gunning Stands.*—Number of stands operated, 134; geese shot, 4695; ducks shot, 9584; live goose decoys used, 5777; wooden goose decoys used, 4090; live duck decoys used, 4632; wooden duck decoys used, 3415.

#### *Migratory non-game Birds—Gulls and Terns*

Owing to the splendid activities of the New England Bird Banding Association, which has a very large membership in this State, the Division has never undertaken the banding of our non-game birds.

The gulls and terns which frequent our territory appeared in usual numbers, but the cold and excessively rainy summer retarded and reduced the period of breeding, with a corresponding lowering of production. But, taken as a whole, these species are at least holding their own, and in some localities the colonies are on the increase.

#### *Federal Control of Migratory Birds*

The Game Refuge Bill continues to be the outstanding piece of conservation legislation in Congress. A small group of irreconcilable Senators, resorting to well-known dilatory tactics, delayed action on the bill until the closing hours of the Senate, when, owing to the filibuster which characterized the close of the last session, it was impossible to advance this, as well as other desirable legislation.

During the summer and fall the bill was very carefully studied, and modified in some important respects so as to remove objections. Its title was changed to read, "A Bill—to more effectively meet the Obligations of the United States under the Migratory Bird Treaty with Great Britain by lessening the Dangers threatening migratory Game Birds from Drainage and other Causes, by the Acquisition of Areas of Land and of Water to furnish in Perpetuity Reservations for the adequate Protection of such Birds; and by providing Funds for the Establishment of such Areas, through Maintenance and Improvement, and for other Purposes."

During the past year there has been considerable clearing up in the minds of our people as to the purpose of this legislation. Various groups which have desired to attain the ends proposed in this bill, but by other methods, now realize that it comes as near to providing protection to our migratory birds as any legislation which can ever be proposed. They have finally come to understand that it is hopeless to expect to maintain the birds we now have, and increase the supply, unless we preserve the producing plants (the remaining breeding grounds, with the restoration of others) and the storage facilities during the winter, for the manufactured product (ample permanent wild life sanctuaries in the wintering zone). If the measure can be brought to a vote in both branches of the Congress without being hamstrung through dilatory tactics, it is certain to become a law in the next session.

#### UPLAND GAME

##### *The Hunting Season*

No concern was felt over the possibility of closing the season this year, due to drought, for the reason that there was more water in our rivers,



due to the cold, wet spring, than has been the case for many years; but the weather was extremely warm throughout the entire period, so that, from the point of view of the hunter and his dogs, it was generally unsatisfactory. However, there were no storms of any great duration to cut down the number of hunting days.

*Pheasant*.—Owing to the unusual amount of water in many localities, much of the usual hunting country was inaccessible, and the birds worked back into such flooded country out of reach of the hunters. All in all, not so many birds were found as during the last two previous seasons. Much of this may be attributed to the conditions just mentioned, but in addition the cold, wet summer was the most unfavorable breeding season that these birds have experienced for a long time.

The total number of pheasants reported shot in open season was 2,356, divided according to counties as follows: Barnstable, 12; Berkshire, 71; Bristol, 174; Essex, 322; Franklin, 70; Hampden, 185; Hampshire, 163; Middlesex, 462; Norfolk, 201; Plymouth, 251; Suffolk, 6; Worcester, 417; locality not reported, 22.

*Ruffed Grouse*.—An alarming scarcity of grouse has been reported from all sections of the State. However, in a few localities here and there the birds have been reported as present in usual numbers, based on the averages of the past five years. A report was requested of all the wardens at the end of the first week of the open season, and with few exceptions the grouse were reported as being alarmingly scarce. Many hunters making their reports on pheasants shot volunteered information on the grouse, which was uniformly to the effect that the birds were very scarce, and many of these reports were accompanied by the suggestion for a close season of from one to five years.

The ten-day period between the closing of the grouse season and the close of the period of this report, has been insufficient for making a thorough survey, but the information at hand indicates that we are at that stage in the life cycle of the grouse where the birds have been reduced to the minimum. Nearly every observer has a different theory as to the cause, but in the last analysis we are simply compelled to admit that we do not know what has brought it about. Undoubtedly the wild hunting house cat and other predatory quadrupeds and birds have taken their toll; the birds have undoubtedly been excessively shot at in some localities; and the conditions during the breeding season were the most unfavorable for some years. But none of these factors seems to be the dominating one, and we are led to believe that the principal cause is the presence of disease.

The New England Ruffed Grouse Investigation Committee is continuing the work along the lines previously laid down. It is steadily adding to the volume of valuable data that is being accumulated concerning not only the diseases to which the grouse may be subject, but on such other problems as food, plumage, moults, vermin, etc. A report by Dr. A. O. Gross of Bowdoin College, Brunswick, Me. (who is in charge of the work in New England) was printed in "The National Sportsman" for June, 1927, and a paper entitled "Investigating the Ruffed Grouse" by Dr. John C. Phillips appeared in "The Sportsman" for June. A statement by the Committee was put out in September. It is planned to continue the work over several more years.

*Quail*.—In what might be called the best quail range (from Boston south and east to Provincetown) the quail has held its own over the past few years. Several years ago the birds increased to very satisfactory numbers, and they have held up very well to that level ever since. With the quail the problem seems to be largely that of providing many suitable feeding grounds, and protection against vermin and the winter kill. It is very seldom that in our short open season the gunners can clean out the quail in a given locality.

It is questionable whether much benefit is being derived from the con-



tinuous close season on quail in various counties. The birds do not seem to be propagating as rapidly as was originally hoped for under this plan. We are inclined to believe that the solution lies in systematic and careful restocking of these regions with adult quail in the spring, and to this end we have resumed the breeding of quail at the Sandwich Bird Farm, as is more fully noted under Propagation of Fish and Game.

It is of interest to record an instance of migration of quail from Penikese Island to Cuttyhunk Island. In May, 1925 we liberated 59 quail on Penikese. Not many days later it was reported to us that quail had been heard whistling on Cuttyhunk Island, for the first time in many years in the history of the village. Three were seen on the "Neck," which is the northernmost point of Cuttyhunk and the nearest point to Penikese, a distance of about one mile.

*Deer.*—There was the usual open season of one week from December 6 to 11, 1926. During this period 2,261 deer were killed, by far the largest number shot in any one year since the season was first opened in 1910. This total consisted of 1,162 bucks and 1,099 does, divided as to county, as follows: Barnstable, 305; Berkshire, 368; Bristol, 95; Franklin, 422; Hampden, 246; Hampshire, 194; Middlesex, 56; Norfolk, 27; Plymouth, 215; Worcester, 332; locality not reported, 1. These figures speak for themselves as to the status of the deer. There was considerable snow during most of the open period, but it was of a depth, accompanied by weather conditions, that was about as hard on the gunner as favorable to the deer.

The indications are that the breeding season in 1927 was favorable, and that we have today a relatively large stock of deer in our State.

Deer shot while damaging crops numbered 108. Claims for damage were paid amounting to \$8,999.41 (the extent of the appropriation), and further claims are pending which must await payment until additional appropriation has been made.

By a change in the law this year the Director is now required to approve these claims for damage done by deer and moose before the same are paid by the Treasurer of the Commonwealth. In all other respects the procedure of handling such claims is the same as during past years. Each claimant is now required to sign, under pains and penalties of perjury, and file a statement of the nature and extent of the damage claimed. The Chief Warden and the inland warden force make an investigation, having before them the appraisal of the local committee containing the final action of the County Commissioners. It is at once evident that this arrangement imposes a great deal of additional work on our warden force and the central office in handling all the details of the claims. Between the time of the enactment of the law and the close of the fiscal year, 185 claims were investigated.

While we have fully discussed, in the letter to the Budget Commissioner under Finances, the broad question of how payment of claims for damage should be financed and the agencies which should handle the entire matter, there is an additional angle to the question which requires further comment. This relates to the extent to which it can reasonably be asked, that the land owners exercise more diligence in protecting their crops and trees against damage by deer. We have already passed on a sufficient number of claims to be able to draw some general conclusions. In some instances the land upon which the crops and trees are located is posted, and the owners admit that they have made no effort to avail themselves of the wide-open provision of the law which permits them to kill, at any time of the year, either on their own land or (with permission) on the land of an adjoining owner, deer which they have reasonable grounds to believe are about to do damage. In other instances we find land owners have set out orchards in isolated places, adjoining the heavily-wooded sections which are well known to contain deer, and have given the trees the minimum amount of attention during a year. We have had

cases where damage was charged up to deer which investigation showed was done by climbing cutworms. There are also cases where the claimants have, year after year, collected for damages to crops in a given small area. By citing these cases we do not wish to cast any reflections on the land owners of our State as a class. We believe that, with a few exceptions, they are earnest and fair-minded and have no desire to take advantage. But at present we have this situation—the appropriations to pay for damage done by deer are now included in the amount which is annually appropriated for this Division to carry on that part of its work of direct benefit to the fresh-water anglers and hunters. In other words, every dollar we pay out for deer damages means just that much less which may be expended on behalf of the hunters and fishermen. The final word as to what shall be paid on a given claim rests with the Director of the Division. While he intends to be as reasonable and fair in his adjustments as is possible, at the same time, under the existing set-up, he and his successors will naturally wish to safeguard the funds, to the end that the largest possible amount will be available for the direct benefit of those who pay in the money. This appears to be a further argument in favor of transferring the duty of determining such damages to the Department of Agriculture or the Massachusetts Agricultural College, and the payment of such claims out of funds raised by general taxation, the same as other activities on behalf of agriculture are financed.

*Squirrels.*—The squirrel population depends directly on the amount of suitable food. The squirrel will travel until he finds it. We have begun to grow at our stations substantial numbers of black walnut trees, which we hope to see widely present over the State during the next ten years. If our people will take a greater interest in planting the hickory nut and black walnut trees it will do more to bring back our squirrels than would any other course. These animals now have a close season of eleven months, and our climatic conditions present no problems. There has been an increase generally throughout the State.

*Hares and Rabbits.*—The absence of cottontails from large sections of our scrub-oak-covered State presents a very interesting study. Undoubtedly it is a combination of factors. The rabbit is the food supply for much of our wild life catalogued as vermin, and there is a longer open hunting season than should exist. We can only renew our statement of previous years, that there is no form of upland game in the United States which can stand the present open season of four months now in force on the mainland.

The extent to which this can be remedied by the importation of cottontails from other parts of the United States is debatable. The large number of sub-species of this animal raises the question as to whether they will successfully inter-breed. But perhaps this is not so controlling a factor as the presence of the disease called Tularemia over large areas of the natural rabbit country west of the Mississippi River. The presence of this disease has caused us to proceed slowly in the importation of cottontails, for we believe that it would be better to adjust our own shooting season and conditions in such a way as to give our native cottontails a more business-like administration, than to try to import them and run the risk of spreading disease.

The conditions are, as usual, "spotty." Some sections where an abundance of cottontails would be expected are practically clean. There are other sections where they are quite plentiful. One solution of this question is the establishment of colonies on certain of our islands from which a limited amount of restocking can be done each year.

*Fur-bearing Animals.*—The amendment to the trapping license law (section 3, Chapter 352, Acts of 1926) resulted in the first systematic census of the fur catch ever taken.

The returns for the calendar year 1927 (the law requires the report to be made for that period) are as follows: muskrat, 33773; mink, 1170;



skunk, 7223; red fox, 2411; gray fox, 155; raccoon, 173; weasel, 889; otter, 35; total, 45,829. The foregoing covers the reports of 1687 trappers.

Judging from the numbers of inquiries we believe that interest in the establishment of privately operated fur farms is increasing, especially respecting the muskrat.

In addition to making the returns required by law we invited comments from the trappers. These revealed wide-spread differences of opinion among them as to open seasons and restrictions in general. There will always be the difficult problem of maintaining the balance between our fur-bearing animals and our other forms of desirable wild life, but we believe that this can be worked out to insure a valuable annual fur catch.

## ENEMIES TO GAME

### *Cats*

The toll taken by the wild hunting house cat from our wild life continues unabated. We believe it is on the increase. We can but continue to warn our people that this menace will have to be dealt with sooner or later, and the longer we postpone taking it up in a firm and businesslike manner, the longer will be delayed an appreciable increase in our wild stock. Legislation to license the cat, and the collection and humane disposition of those unlicensed, is an entirely reasonable proposition.

During the year the county treasurers paid out \$1,020 in bounties on 102 wild cats, for which they were reimbursed from the Treasury of the Commonwealth. We renew our suggestion that there should be an increase in this bounty, in order to encourage the reduction of its numbers. Also that there should be a uniform law throughout the New England states under which to approve and pay claims for these bounties.

### *Hawks, Owls and other Vermin*

In our previous report we spoke of the invasion of the State, in the late fall and early winter of 1926, by goshawks and snowy owls. These birds continued to increase in numbers well into the winter of 1926-7. It is safe to say that it was the heaviest migration of these species that the State has seen in many years, and the stock of grouse suffered accordingly. Reports of destruction of grouse by goshawks were received from all parts of the State. While the snowy owl likewise appeared in unprecedented numbers, little tangible evidence was produced to show that they did any damage.

## RESERVATIONS

### *Martha's Vineyard Reservation*

Dr. Alfred O. Gross has continued his scientific study of the heath hen, and we have continued to rely on his recommendations. He made his annual investigation in the spring, and his report is as follows:

"The 1927 annual census of the heath hen of Martha's Vineyard island, Massachusetts, has just been completed under the auspices of the Federation of the Bird Clubs of New England Inc. It was taken under ideal conditions of weather and was done with unusual thoroughness, since I was assisted by Mr. Arthur L. Clark, former chairman of the Heath Hen Committee, Mr. Allan Keniston, superintendent of the reservation, and Mr. Edward F. McLeod, the special warden employed by the Federation. We were able to account for 13 birds and there are today probably less than 30 birds on the entire island. How much less it is impossible to state. The largest number of birds seen at any one time was ten on the farm of James Green near West Tisbury. We also noted, but never on the same day, 3 birds on the Thompson farm, 3 on the Dr. Fisher Road, 3 on the reservation and 2 on the Bowker Road. If we should include all of these numbers it would total 21 birds, but it should be emphasized that all of these places are within easy range of each other and a careful study of the records clearly indicates them to



be duplications, with the possible exception of the 3 birds seen on the Dr. Fisher Road. During the past winter all of the heath hen were concentrated on the Green Farm and there were never more than 13 birds. This spring when the birds began to appear at other places the Green flock dwindled correspondingly, making it obvious that the birds were dispersing from this one place. Birds were reported from 5 other sections of the island but we have no evidence of their existence there, other than the person who reported them. A diligent search by the wardens, and also repeated visits to the localities by those taking the census, failed to verify the reports.

"It is apparent that thus far our hopes of greatly increasing the numbers of heath hen have not been realized. To the contrary, review of records and a consideration of the conditions under which the counts were made for the past few years inclines me to believe that there has been a steady decrease since the count of 54 birds made in 1924. The numbers reported from year to year are subject to considerable error because of the difficulties involved in taking the census. For example, the estimate of 25 birds in 1925 may be a little too low and our estimate of 35 in 1926 a little too high. This year, however, the two wardens, aided by numerous citizens of the island, have made a greater effort than ever before to locate every heath hen. Furthermore, the conditions under which the present census was taken were ideal for locating a maximum number of birds. It is therefore probable that the number 13, rather than the estimate of 30, more clearly represents the number of heath hen in existence today.

"The Federation of the Bird Clubs of New England Inc. has expended nearly \$7,000 during the past year in maintaining a special warden at the island to assist the State in saving the birds. Mr. McLeod, the Federation warden, has shown great enthusiasm and has been very energetic in his work, but his efforts, through no fault of his own, have not produced tangible results. The problem of saving the heath hen is not the simple one of providing protection against hawks and cats, and of supplying food when needed, but it is very complex. A study of the heath hen problem has revealed other important factors such as the inadaptability of the species, excessive interbreeding, excess male ratio and disease, which are not readily controlled by the wardens. Disease is probably the most potent factor in the decline of the heath hen. We now have evidence that the heath hen have been infected with "blackhead," that disease dreaded by all poultrymen, especially those who have attempted to raise turkeys. The finding of this disease in adult heath hen is, according to Dr. E. E. Tyzzer of the Department of Pathology, Harvard Medical School, strong presumptive evidence that it is most destructive to the young birds. Even in turkeys, where it is most fatal, it is seldom found in adults, but entire flocks of young are quickly wiped out of existence. Unfortunately this disease is carried by poultry, and herein lies the great danger to the heath hen. The heath hen have the habit of congregation on the open fields, especially in the spring, to go through their weird and peculiar courtship antics. These fields are usually near farm houses, as is the case on the reservation, and in most instances the poultry have the freedom of the same field. I have seen poultry and heath hen feeding together, thus offering every opportunity for infection. Several birds have been found dead or in a dying condition, emphasizing the importance of disease in the present status of the heath hen.

"These facts present an entirely new angle to our problem and the Federation will do well to turn its energies in that direction. In spite of the fact that there is an apparent decrease in the number of birds the Heath Hen Committee will be continued, and I gladly offer my services whenever needed. The State Division of Fisheries and Game has expressed its determination to continue the Heath Hen Reservation as long as there

is a living heath hen. Director William C. Adams has already taken positive steps to fight the problem from the standpoint of disease. On the advice of Dr. E. E. Tyzzer, expert on game bird disease, Superintendent Keniston has been instructed by Director Adams to remove all poultry from the reservation and to sterilize the premises where poultry has been kept. Garden plots, containing a variety of vegetables relished by the heath hen, were planted last summer and are being continued this year. A large part of the forestry reservation of 5,000 acres, which surrounds the heath hen reservation, is to be closed to hunting to reduce to a minimum the disturbances caused by hunters during the rabbit season. This, if carried through as now planned, will include practically the entire area occupied by the heath hen. The fire stops are being continued and greatly extended by the Division of Forestry, which will lower the risks to the heath hen by fires. During the past year the Division has added an additional warden on Martha's Vineyard, who will now continue as an assistant to Mr. Keniston in protecting the heath hen. Under these conditions it does not seem advisable that the Federation should continue the great burden of financing Mr. McLeod, who can accomplish but little in addition to that now being well done by the State with the assistance and advice of the Federation Heath Hen Committee and all persons vitally interested in the heath hen.

Alfred O. Gross."

The Federation continued to maintain Mr. Edward McLeod to assist in the protection of the heath hen on the Vineyard up to May 1. We were notified that on and after that date his services would not be retained.

In a letter dated April 29 we were advised of the formation of a Heath Hen Committee under the auspices of the Martha's Vineyard Rod and Gun Club, and of their intention to continue the services of Mr. McLeod as of May 1.

Mr. McLeod has continued as an unpaid warden of the Division, and in addition to the predatory birds unprotected he was given special authorization to kill marsh hawks.

There was only one fire of any importance,—on April 28 and 29. It began very soon after noon, and, owing to the high wind, spread very rapidly in spite of the fact that a half-inch of rain fell during the night. It started at a point about a mile east of the reservation house and travelled in a southeasterly direction to a corner a bit northeast of Wintucket Cove and bordering the cover, following around the Cove to Naushemois Point and to the valley of Janes Cove, west to a point on the main road between Edgartown and West Tisbury, and thence northerly to the point of beginning. Some 850 acres were burned over, according to the estimate of the Forestry Division, and of this 300 acres had been burned the previous year. From observations during the fire and immediately thereafter we believe no damage was done to the heath hens. The territory burned over was not that which in recent years has been frequented by the heath hen to any extent.

Superintendent Keniston has continued to follow the policies worked out by the Division and Dr. Gross as best calculated to surround the remaining heath hen with favorable conditions under which to reestablish themselves. He has continued trapping, and from December 1, 1926 to November 30, 1927 collected the following vermin: 21 cats, 17 crows, 10 hawks and 61 rats.

The stomachs of most of the specimens collected were forwarded to Dr. Gross for examination.

Although we have received unconfirmed reports of flocks of young heath hen, there is no evidence to indicate that the remaining birds bred to any extent. In order to have a definite standard by which to judge the condition of the colony, it was decided several years ago, to rely on the annual spring census when the birds have collected on the breeding grounds



and are most easily located by the calls given during the mating period.

It is hardly necessary for the Division to state its intention to continue its efforts to bring back these birds until the last living heath hen is accounted for.

### *Penikese Island Sanctuary*

During the winter of 1926-7 the principal effort at Penikese Island was directed toward inducing as many migratory wild fowl as possible to take advantage of the food and water supply on the island. To further this, we maintained a group of live wild goose decoys and a flock of duck decoys, and at all times kept grain easily accessible to any visitors. The daily reports of the superintendent showed an increase in both geese and ducks coming to the island. It is of interest to note that on May 10, six and on May 11 nine woodcock alighted on Penikese Island.

The effort to make this island a way-station for migrating wild fowl will be continued, and it is expected that, as the years go on, increasing numbers will not only visit it, but will linger in the nearby open waters through a longer period of the winter. Hundreds of geese commonly winter on Martha's Vineyard. It is but a short flight to Penikese, and as time goes on, when these birds have become aware of the available feed on Penikese, we believe that a combination of food, water and resting grounds will attract them further.

The terns arrived and departed about on schedule. The breeding season was unfavorable, but with a larger production of young than the previous year. These (100 in number) were banded.

The few remaining quail have stayed on the island and raised a small flock.

A good stock of cottontail rabbits was on hand at the beginning of the breeding season and they bred well. Beginning in the early part of September and extending over a brief period, 240 cottontails were trapped and shipped to the mainland for restocking purposes (see Game Distribution).

The white hares did not prosper. It was planned at one time to remove the remnant, but eventually they were left to see if they would re-establish themselves. This did not occur, and the remaining 27 hares were removed and distributed on the mainland.

In the early spring, when there was no danger from fire, the frame buildings formerly occupied by the lepers were burned down and the debris piled into the foundations and partly covered over. Off and on during the spring the caretaker continued digging to enlarge one of the fresh-water ponds which was later enlarged by blasting.

During the summer the usual amount of vegetable food was grown for winter feed for the rabbits.

During the latter part of August an expert blaster levelled, with dynamite, what had been the house of the former resident doctor, and the adjoining buildings. The latter were built of steel-inforced concrete. They were too large to be of practical use in connection with the island as a sanctuary, and would have only cost large sums in annual upkeep, for no useful purpose. A small wing of the main building has been retained and made over into a bungalow for the resident caretaker. The caretaker worked in cooperation with the Biological Survey in the census of waterfowl, and the island was a bird banding station during the summer and fall of 1927.

### OTHER SANCTUARIES

The buildings on the Henry Cabot Lodge Bird Sanctuary (Egg Rock) were removed as a result of an appropriation of \$400 for that purpose, and the island is now restored to its primitive condition. A careful study will be made to ascertain whether unobstrusive catch-basins to hold fresh-water for birds can be built, and whether food supplies can be grown on any part of it.



The Isaac Sprague Bird Sanctuary (Carr Island) is being gradually stripped of its buildings. This year a large hen house, the large barn, and the cottage house were removed. The lumber from these buildings was salvaged, rafted across to the mainland and will be used in repairs, replacements and new construction at the game farms and fish hatcheries. In this work gifts of money totalling \$150, given for this purpose, were used (see Acknowledgments), together with \$450 from our appropriations, and labor of wardens. The remaining buildings (or, at least, the two-story boat house) should be removed and the island restored to its primitive condition. It bears a splendid growth of trees and has possibilities as an all-round sanctuary. In particular the fresh-water pond should be restored by building a new flume and repairing the embankments. There are springs in the bottom of this pond, and if the dam and dikes can be built up to the point of excluding the salt water at a high course of tides, a splendid fresh-water pond could be provided on the main migration line along our coast. When once fully developed this sanctuary should be another splendid way-station for feeding and watering our migratory birds.

The Watatic Mountain Wild Life Sanctuary was enlarged by the addition of an adjoining tract of 39 acres on which there is an equally fine spruce growth, giving a total area of 139 acres. (See Acknowledgments)

A new sanctuary was added to our holdings by the gift (see Acknowledgments) of 137 acres of land on Little Wachusett Mountain, in Princeton. This comprises both woodland and open country, with a variety of shrubbery and underbrush which will furnish ideal homes for wild life of various kinds. The State has commemorated the gift by a bronze tablet, which has been affixed to a large boulder on the sanctuary, near the State highway from Princeton to Gardner and Fitchburg.

The land adjoining the game farm at East Sandwich (the so-called Hoxie property), given to the State by the Associated Committees for Wild Life Conservation, Inc. is a valuable addition to our holdings. It comprises marsh, meadow and upland of typical Cape Cod character, and is bordered on one side by a small State pond, on other sides by Scorton Creek and Mill Stream, being separated from the present game farm by the latter. This stream can be dammed up at a reasonable cost to flow a large fresh-water pond on the edge of the salt marsh. On the land are other spring holes surrounded by clumps of well-grown trees. On this area, in the early spring and during the breeding season, are to be found an unusual variety of song and insectivorous birds. This gift establishes the first public fishing ground ever provided in the State. Prior to the transfer to the Commonwealth certain adjustments of small parcels of land were made with Henry Johnson, an adjoining cranberry-bog owner, that will permit of a fine entrance to the sanctuary and game farm being built from the main State road on the Cape.

There were no funds available for the development of any of the other sanctuaries, and there is nothing of special note to record in connection with Ram Island or the Knight Bird Refuge.

#### *Reservations under Sections 69-75, Chapter 131, General Laws*

The term of the Mansfield-Foxboro Reservation expired on October 18, 1927.

### INLAND FISHERIES

#### GENERAL

(Additional details concerning the individual species will be found under Propagation of Fish and Game, and Fish Distribution.)

For several years we have annually stressed the need of further restriction on the fishing in our inland waters, particularly in the great ponds. We have repeated, over and over again, about all that can be said on this subject. We have stated, over and over again, that we do not

believe that our ponds can stand the drain of the present volume of fishing. Our Massachusetts ponds are stocked with pickerel, horned pout, white and yellow perch and blue gills, together with large-mouth and small-mouth black bass. None of these fish except the small-mouth black bass, can be artificially propagated to the same extent and by any such methods as those by which we are now producing trout. We are carrying on the propagation of small-mouth black bass along the accepted lines of bass breeding, but the production is limited and the processes laborious and expensive.

We have provided short closed periods, during the breeding seasons of the pond fish enumerated above, have established minimum lengths and daily catch limits, and prohibited their sale; but we still continue to fish these species, on the average, ten months in each year.

Limited quantities of such fish can be produced by the pond cultural method (which consists of placing selected brood stocks in ponds which can be drained out flat for the collection and distribution of the small fish), and salvage operations (which consist in trapping fish out of waters closed to public fishing and liberating them in open waters); but we will always have to rely, for the most part, on natural production. Our ponds differ from our streams in that natural conditions are less disturbed and changed than is true of our trout brooks. In other words, natural breeding conditions continue, in the main, unchanged in our ponds. But in respect to those species where we must rely on natural reproduction we are permitting long open seasons of approximately ten months, while there is only three and one-half months of open season on our artificially propagated trout. Certainly the inconsistency of this scheme must be apparent to any one.

When we first began advocating further restrictions on the length of season of our pond fish we received very little encouragement or support throughout the State. But, as time goes on there is evidence of a great change of sentiment. When, in the fall of 1925, we submitted to the 150-odd local fish and game clubs various propositions for legislation, we put this question—"Do you favor a closed season in all our inland waters, on all fish (except trout) for the period of January 1 to July 1?" Of the 52 clubs answering our questionnaire 14 voted in favor of such closed season and 38 still oppose it. Five years ago we doubt whether a single association in the State would have voted in favor of the proposition.

The period mentioned covers the season from the time that pickerel are beginning to collect on the spawning grounds, on through the spawning seasons of most of our pond fish. It is now broken up with many short closed seasons on the several species. The proposed arrangement would permit of some winter fishing (in December) while still giving our ponds a much-needed rest; would protect all of our fish during the breeding season, which is a fundamental requirement of all successful propagation; and would greatly simplify our problems of law-enforcement and make for greater efficiency in this branch.

We believe that if this plan were given a fair test over a five-year period, our fishermen would never seek to change it.

### BROOK TROUT

The opening of the brook trout season is a red-letter day in the lives of our fishermen. During this past season they were subjected to an almost unbearable restraint, due to the fact that the opening of the season (normally April 15) was postponed by reason of drought. Under existing law His Excellency the Governor has authority to exclude all persons from the woodlands when fire hazards make this action advisable. Such conditions prevailed this year. His Excellency expressed great sympathy with the rank and file of our fishermen who were keen to start, and delayed action as long as was practicable, hoping for rain; but on April 14, by proclamation, he closed the woodlands not only to fishermen



but to the entire public, with assurances to the fishermen that the season would be extended on the other end by the number of days it should remain closed. In this action he was supported by the officers of this department and the general public, for it is self-evident that if we are to retain our trout streams in even their present volume and temperature it is necessary to preserve the forests. By a second proclamation the season was opened on April 23 and extended to August 8 (8 days beyond the usual end of the season) thus restoring to the fishermen the lost days.

Owing to the heavy plantings of trout from six to ten inches in size, more fish were taken throughout the State than in many years.

#### LOCH LEVEN, BROWN AND RAINBOW TROUT

After several years of effort we now have our own brood stock of Loch Leven trout. While there is little distinction between the so-called brown and the so-called Loch Leven trout, we prefer to refer to them as Loch Leven, for the reason that our stock was built up from eggs brought in from Montana. We feel that the suitability of the brown trout in our larger, warmer streams has already been demonstrated. This species should also have possibilities for restocking a selected number of our great ponds, providing that we can use two-year-old fish for this purpose.

The light stocking of some of our larger streams (particularly in the western part of the State) with rainbow trout in recent years has demonstrated the suitability of this fish for at least a portion of our trout waters.

#### CHINOOK SALMON

We have continued limited plantings of Chinook salmon fingerlings in certain of our ponds which, from past experience, seem favorable for these fish.

#### WHITE PERCH

The usual salvage operations were conducted at Tashmoo Pond on Martha's Vineyard. As the years go on we believe that the results from stocking with white perch justify our efforts along this line.

#### PIKE PERCH

The pike perch seem to be holding their own in the Connecticut River. It is hoped that in time the supply will increase to such an extent that we may be able, each spring, to collect a sizeable quantity of eggs. Such eggs could be hatched in a temporary battery set up on the shores of the river near the spawning ground, where the fry could immediately go to the river after hatching.

#### PICKEREL

As mentioned in other parts of this report, we continue to stress the need of further protection to the pickerel by some limit on the present open season. The pickerel is the most popular fish in the State, taking our anglers as a class. While relief from excessive fishing is the first requirement to bring back the pickerel stock, this should be supplemented by the establishment of additional rearing units similar to the Stockwell Ponds (hereinafter reported upon) and the fitting out of additional salvage units.

#### SMELT

There has been little change in the status of the smelt. On the South Shore it is a question of keeping the remaining spawning grounds free from pollution and the fish free from disturbance during the spawning season. On the North Shore the latter problem is the chief one. The fishing season, taken as a whole, would indicate a slight falling off in supply in both regions. It is a marvel that these small, delicate fish have been able to adapt themselves to the changing conditions in the few spawning areas still left, and to persist in the face of the amount of disturbance by lawless fishermen which they have encountered during the



spawning period. There is still an opportunity to preserve this splendid fishery on at least some sections of our coast, but it can only be done either by the riparian owners cooperating in setting aside the land adjoining these spawning grounds to be part of the general breeding grounds, in order that we can effect better law enforcement, or by the Commonwealth taking, by eminent domain, strips of land on either side of these spawning grounds in order that the public can be absolutely excluded during the spawning season.

We renew our recommendation that the license law should be extended to include smelt fishermen, in order that funds may be available to do more work on behalf of the smelt. Also that the commercial fishing for smelt should be prohibited.

#### BASS

We have continued our policy of limiting the planting of bass to a selected list of ponds in which they are already established, instead of making indiscriminate plantings in increasing numbers of our waters. The bass fishing this year was the best in several years.

#### HORNED POUT

The horned pout continues as one of our most popular fish. Interest in it is increasing probably more rapidly than in any other, and its value as a food supply and its edible quality is becoming more fully appreciated. The horned pout can be satisfactorily produced by the pond cultural method, and we shall direct our efforts to increasing the supply available for distribution.

#### PONDS

##### *Public Rights*

We have predicted a growing interest by the public in the laying out of public rights of way to our great ponds. The general right of the public to cross private lands in order to go on to our great ponds has been the subject of various opinions by former Attorneys General. There have been some court decisions, but the matter is still surrounded with considerable doubt and vagueness. However, the recently enacted law (Chapter 453, Acts of 1923) makes it possible for ten or more residents of the Commonwealth to petition the Department of Public Works to lay out a public right of way where public necessity makes this advisable.

Since the enactment of that law the Department of Public Works has acted on petitions to establish rights of way to the following great ponds:—

Long Pond, Lakeville. Petition heard Oct. 24, 1923. Petition dismissed as this pond is used as a source of water supply.

Long Pond, Blandford. Petition heard May 1, 1924. Report made to Legislature, House No. 209 of 1925, resulting in the passing of Chapter 102, Acts of 1925.

Glen Echo Lake, Stoughton. Petition heard June 25, 1924. Report to Legislature, House No. 178 of 1925.

Little Pond, Sherborn. Petition heard May 14, 1925. Report to Legislature, Senate No. 19 of 1927.

Island Creek Pond, Duxbury. Petition heard Nov. 19, 1925. Report to Legislature in House No. 227 of 1927, resulting in the passing of Chapter 186, Acts of 1927.

South Pond, Savoy. Petition heard March 18 and 25, 1926. Report to Legislature in House No. 123 of 1927.

Two petitions are now pending, one regarding Walkers or Bucks Pond, Harwich (heard December 2, 1926); and one concerning Flax Pond, Brewster (heard February 3, 1927). No decision has yet been reached by the joint board.

From the beginning of our colonial government until 1869, free fishing (as well as other rights) was preserved to the inhabitants of the

Commonwealth in all natural great ponds of ten acres and upwards. That public right remained intact for more than 200 years. In 1869 these public privileges were abridged by Section 8, Chapter 384 of the Acts of that year, which reads as follows:

"The fishery of any pond the superficial area of which is more than twenty acres, shall be public, except such as may have been granted specially by law or leased as hereinafter provided, and all persons shall, for the purpose of fishing, be allowed reasonable means of access to the same without rendering themselves liable to prosecution or action for trespass."

The essential part of that law is retained in our General Laws, Chapter 130, Section 24, which reads:

"The fishery of a pond, the area of which is more than twenty acres, shall be public, except as hereinafter provided; and all persons shall, for the purpose of fishing, be allowed reasonable means of access thereto."

Upon referring to the annual report for the year 1869 it is apparent that this change in the law was the result of a recommendation by the then Commissioners of Fisheries. The main purpose of the change seemed to be to encourage the artificial propagation of fish in natural great ponds between 10 and 20 acres.

The experience of the succeeding years shows conclusively that the passage of this law did not result in the riparian owners, (who were given the exclusive control over the fisheries in these natural great ponds between 10 and 20 acres) embarking on the propagation and protection of fish. Rather it took away from the public the right of free fishing in these natural great ponds between 10 and 20 acres, without any compensation, and without any resulting benefit to the fisheries.

The public should never have been deprived of these rights, and we feel certain that when the situation is fully understood there will be an irresistible demand for their restoration.

#### *Great Ponds Stocked and Closed*

Up to the present year it has been our practice, when stocking ponds under Section 28, Chapter 130, General Laws, to apply to all ponds a uniform set of rules during the three-year period in which regulations are applied to the fishing. The regulations close the pond to all fishing except between May 30 and October 31 inclusive of each year; and close the tributary streams except between April 15 and July 31 inclusive, until the date the regulations expire. Fishing is permitted only with a hand line and single hook, or with a single hook and line attached to a rod or pole held in the hand. These regulations are known as "Form 1."

During the year the city and town governments (on whose request action is taken) were given the choice of having the old regulations applied, or modified regulations by which fishing is permitted with not more than two hooks and lines (a plug, spinner or artificial bait rigged with triple or gang hook to be considered as one hook), subject to all laws relative to the open seasons on the taking of fish. These regulations are known as "Form 2."

The following-named ponds were stocked with regulations, Form 1, expiring (except as noted otherwise) November 1, 1930:

Nesseponsett Pond, Dana and New Salem (from Feb. 1, 1927 to Nov. 1, 1929).

Great or Ashfield Pond, Ashfield

Massapoag Lake, Sharon

Nippenicket Pond, Bridgewater

Fort Pond, Littleton

The following-named pond was stocked under Regulations, Form 2, expiring Nov. 1, 1930:

Scaddings Pond, or Sabbatia Lake, Taunton.



*Boundary in Congamond Lakes*

Negotiations between the fish and game departments of Massachusetts and Connecticut resulted in an agreement covering the enforcement of the fish and game laws of the respective states on Congamond Lakes, Southwick.

Markers were set up on the opposite sides of the entrance to Pickerel Cove in South Pond, with notices informing the public that the waters on the cove side of a line drawn from one marker to the other will be under the jurisdiction of the State of Connecticut. The remaining portions of the ponds will be under the jurisdiction of Massachusetts.

Any one fishing in Pickerel Cove inside of a straight line drawn from one marker to the other, or fishing from the Connecticut shore, in any part of the Congamond Lakes, will be required to have a Connecticut fishing license.

Any one fishing any part of Congamond Lakes from the Massachusetts shore, or from the water anywhere (outside of a line drawn from marker to marker in Pickerel Cove) will be required to have a Massachusetts license.

The foregoing arrangement is to serve simply as a *modus vivendi* and is not intended to affect the legal boundary between the States.

*Privately-owned Ponds Stocked*

In last year's report we discussed at length the advisability of removing from the present license law the provision that a sporting license is required for fishing only those inland waters which have been stocked by the Division since January 1, 1910, to the end that such sporting license would be required of all persons who fish any of the inland waters of the Commonwealth. We made a recommendation to the Legislature to this effect, which was favorably reported by the Committee on Conservation, but failed to pass in the Senate.

In order to extend the operation of the law and increase the revenues of this Division, much time of our office force was spent, during the year, in obtaining the consents of persons owning the land and water rights around the natural great ponds under twenty acres in area, and owners of privately-owned waters, to a stocking of the same by the State.

Following is a list of such ponds which were stocked during the period of this report, on the stipulation of the riparian owners that the public may fish therein for the period indicated (in most cases, 10 years):

<i>Pond</i>	<i>Town</i>	<i>Fishing permitted to</i>
Assabet Mill Pond	Maynard	Sept. 28, 1937
Agawam Mill Pond	East Wareham	Nov. 16, 1937
Bullardville Pond	Winchendon	Apr. 22, 1937
Barker Pond	South Acton	Sept. 28, 1937
Boon Pond	Hudson, Stow	Sept. 28, 1937
Brookside Pond	Westford	Nov. 8, 1937
Bennetts Brook Pond	Ayer	Nov. 8, 1937
Clear Pond	Carver	Apr. 9, 1937
Clarks Pond	Amesbury	June 10, 1937
Deans Pond	Oakham	Nov. 16, 1937
Duck Pond	Dennis	Apr. 28, 1937
Elbow Pond	Plymouth	May 31, 1937
Flanagans Pond	Ayer	March 29, 1937
Falls Pond	No. Attleboro	Nov. 2, 1937
Fredonian Mill Pond or Double Pond	Shirley	Oct. 4, 1937
Green Sea	W. Brookfield	June 3, 1937
Groton School Pond	Groton	Sept. 28, 1937



Goddard Pond or Ripple Lake or Pratts Pond	Grafton	June 17, 1937
Gardner Lake	Amesbury	Nov. 8, 1937
Hazelbrook Pond	Wayland	May 17, 1937
Hunt's Pond	Brockton, Abington	Apr. 22, 1937
Highland Lake	Norfolk	Apr. 8, 1937
Hammond Pond	Brookline	Apr. 30, 1937
Howard Pond or Winchendon Reservoir	Templeton	Nov. 21, 1937
Huckins Pond or Pratt Pond	No. Grafton	June 17, 1937
Harris Pond	Stoughton	Oct. 28, 1937
James E. Whitin Mill Pond	Uxbridge	Nov. 25, 1937
Kendall Pond or Daniels Pond	Gardner	Nov. 21, 1937
Lower Naukeag Lake	Ashburnham	Oct. 16, 1936
Lower Mill Pond (Stony Brook System)	Chelmsford	Apr. 27, 1937
Lakeview Pond	Foxboro	Sept. 26, 1937
Middle Mill Pond (Stony Brook System)	Chelmsford	Apr. 27, 1937
Moore's Canal	Chelmsford	Apr. 27, 1937
Mechanic Pond	Attleboro	Nov. 12, 1937
Merino Pond	Dudley	May 11, 1937
Mirror Lake	Wrentham, Norfolk	Sept. 26, 1937
Mud or Muddy Pond	Westminster	June 11, 1937
Muzzy Meadow Pond	Spencer	Nov. 23, 1937
New or Willett Pond	Norwood, Walpole, Westwood	Apr. 5, 1932
Orcutt Pond and Brook	Orange	Dec. 18, 1936
Peter Pond	Dudley	May 11, 1937
Phoenix or Double Pond	Shirley	Oct. 4, 1937
Reeds or Spring Lake Pond	Rockland	Apr. 20, 1937
Scoux or Scoke Pond	Plymouth	Apr. 22, 1937
Stoney Brook Pond	Norfolk	Apr. 8, 1937
Sweets Pond	West Mansfield	Apr. 19, 1937
South Acton or Faulkner Pond	Acton	Sept. 28, 1937
Tuxbury's Pond	Amesbury	Nov. 8, 1937
Upper Mill Pond (Stoney Brook System)	Westford, Chelmsford	Apr. 27, 1937
Upper Dam Pond	Foxboro	Sept. 26, 1937
Witch Pond	Foxboro, Mansfield	Apr. 19, 1937
Westville Pond	Taunton	Nov. 23, 1937

Following is a list of privately-owned ponds, stocked with the consent of the owners, but without the stipulation permitting the public to fish therein for a period of years.

<i>Pond</i>	<i>Town</i>
Duck Pond	Wellfleet
Higgins Pond	Wellfleet
Long Pond	West Rutland
Mt. Hope Mill Pond	North Dighton
No. Triangle Pond	Plymouth
Plympton Pond	Walpole
Turners or Morey's Pond	Walpole
Turners Pond	Milton
Vose Pond	Groton

In both groups of waters it is necessary that a sporting license be purchased in order to fish them.

The following privately-owned ponds were stocked on agreement by the owners to permit the Division, in future, to take an equal amount of stock from the resulting increase:—Pond at Wayside Inn, Sudbury, owned by Henry Ford, blue gills; Shawsheen Village Pond, Andover, owned by People's Ice Company, Andover, brook trout.

### *Breeding Areas in Great Ponds*

Upon a petition (received in October, 1926) from the town of Webster, that portion of Lake Charbunagungamaug (also known as Webster Lake) that was cut off by the construction of the New York, New Haven and Hartford Railroad Company abutting land owned by Timothy Toomey and others on Thompson Road in the town of Webster, was set aside as a breeding area for food fish of all species, for five years from January 1, 1927, with the following regulations:

"No fish of any species shall be taken from said waters without the written consent of the Director of the Division of Fisheries and Game—provided that employees of the Division may take fish for re-stocking purposes."

Violation of the law carries forfeiture of license and fine not exceeding twenty dollars.

This is the first town which has taken advantage of the opportunity afforded by Chapter 191, Acts of 1924, to provide sanctuaries for the breeding of fish in the ponds within their borders.

A petition for similar action on Lake George, also known as Wales Pond, in the town of Wales, was received and acted on, but the regulations do not become effective until the period of the next report.

### FISHWAYS

Three new fishways were installed on alewife streams during the year, namely: Mill Creek, Sandwich; Herring River, Brewster; and on the outlet to Robbins Pond, East Bridgewater.

Continuing the practice of other years, all fishways were examined periodically during the spring run of fish, and the flow of water regulated from the beginning to the end of the run. At the Lawrence fishway, observations and the regulating of the flow of water through the fishway were handled by a man engaged especially for the purpose, and paid by the Commonwealth. On all other fishways, these duties were performed by the Division's own wardens, and frequently employees of the mill companies, who recorded the species passing through the fishway day and night.

A brief report on the more important fishways is as follows:—

#### *Saugus River*

*Universal Tide Power Company.*—The fish surmounted this dam at East Saugus without difficulty during the spring run. There is no fishway at this dam, and none is necessary since there are times when, in the course of the company's operations, there is a sufficient flow of water over the dam to permit the alewives to surmount and pass upstream. By next year it is probable that some of the timber will be gone from the dam which will make conditions even better.

*Wallace Nutting Dam.*—Observations were made on the new fishway installed on this dam in 1926, at various times during the spring run of fish and while none were reported actually seen in the fishway, good runs were reported in the river in general up as far as this fishway.

*Prankers Pond Fishway.*—The new fishway installed on the property of the United States Worsted Company at Prankers Pond (the next obstruction above the Wallace Nutting Dam) was in operation during the



spring run of fish for the first time since its completion. The employees of the company regulated the flow of water and made periodical observations for different fish using the fishway, but none were observed. About the end of May, it was reported to this office that the United States Worsted Company, on whose property this fishway was located, had gone out of business and had sold the property.

*Collins Fishway.*—This fishway located in North Saugus, the completion of which opened up the entire Saugus River from the sea to the headwaters, was in operation during the spring run of fish for the first time since its construction and was found, upon periodical observations and inspections, to be functioning properly.

#### *Ipswich River*

*Ipswich Mills Fishway.*—This fishway was in operation from April 20 to June 6. The weather during the month of May was so rainy and cold, along with the heavy freshets, that it looked for some time as though there would be no run of alewives in this stream. But they finally came along in very large schools. From May 19 to 29, there were many more fish observed in this fishway than have ever before been seen. From June 1 to June 6, very few fish were seen. During the entire spring run, no fish other than alewives were seen either in the river or the fishway.

*Norwood Mills Fishway.*—Frequent observations were made on this fishway during the spring. Large numbers of yellow perch and pickerel were observed outside, one of the latter measuring 16 inches. As for the alewife in the Ipswich River we have this species well started and in the course of a few years the fishery should be of some little importance. It is the opinion of those familiar with this stream that most of the alewives spawn on the several reaches of still water between the Ipswich Mills and Norwood Mills fishways. As the run increases from year to year, the alewives will doubtless work farther and farther upstream.

*Willowdale Dam.*—Periodical inspection was made of this fishway from the time the river opened up, early in the spring, until the latter part of June, and it was found to be functioning properly at all times.

#### *Merrimack River*

*Lawrence Fishway.*—The flume on the Lawrence fishway which connects the fishway with the dam was connected on April 28 and observations began on the 30th. A big run of fish was reported from May 17 to June 15, after which time no fish were seen. Extensive repairs were made on this fishway after a period of 6 years since its construction, these being made necessary by the exposure of the fishway to severe weather, ice and snow.

*Lowell Fishway.*—This fishway was in operation during the spring run of fish and periodical inspections were made by members of this Division.

#### *Paskamansett River*

*Cummings Fishway.*—The fishway located at Russell Mills, South Dartmouth was inspected during the spring run and the same conditions found to exist as in the past. Certain changes and corrections are necessary on this fishway before it will function properly and plans for the accomplishment of this are now being made.

#### *Taunton River System*

*East Taunton Fishway, Raynham.*—The first alewives appeared below this fishway on March 19, during an unusually warm spell of weather. The weather becoming cold again they went back into deep water and did not return to the fishway until April 1. There was an unusually heavy run the last two weeks of April and the first two weeks of May. Repairs were made in the top compartment of this fishway, thereby enabling the fish to reach the river above with less effort and in greater numbers.



*Jenkins Leatherboard Company Fishway.*—This fishway was in operation during the spring run. The first alewives were observed as early as May 2 and were seen from then on in large numbers below the dam and in the raceway back of the mill. On May 10 and 19, large numbers were seen passing through the fishway. At one time during the spring run as many as 200 alewives were seen below the dam of the Stanley Works, the next obstruction above this fishway, proof that this number at least had used the fishway to ascend to the headwaters.

*Stanley Iron Works Fishway.*—Numerous observations were made by a representative of this Division and also by employees of the foundry. On May 17 and 23, large numbers of alewives were observed in this fishway. Late in May, alewives were observed pocketed below the dam. This Division installed a screen to act as a leader, thereby directing these alewives to the lower compartment of the fishway. On May 17, 130 adult alewives were collected at East Taunton and planted above this fishway. No alewives were observed in the vicinity of this fishway after May 23.

*Easton Investment Company Fishway.*—Careful observations were made at this fishway from April 3 to June 1, but perch, an occasional pickerel, and very great numbers of suckers were the only fish observed in the river, with the exception of two live alewives and a few dead ones near the dam.

*Hanson Cedar Company Fishway.*—This fishway was inspected during the spring run of fish, and, as stated in previous reports, operates properly when there is sufficient water in the river. Alterations will be made on this fishway eventually.

*Carver Cotton Gin Company Fishway.*—This fishway was in operation during the entire season and was inspected frequently. No alewives were observed at any time and it is more or less of a mystery why they do not appear in this branch of the Taunton River System at East Bridgewater. A number of yellow perch were seen early in May below the fishway. After another year of careful watch for alewives, the owners will be requested to proceed with the changes necessary to enable all species of fish to ascend the fishway.

*Electric Light Power Plant Fishway and Star Mills Fishway.*—These two fishways located on the Nemasket River, Middleboro, were in operation as usual during the spring run of fish and observations were made by representatives of this Division from time to time. Large numbers of alewives were seen passing through them without difficulty.

#### *Agawam River—E. Wareham*

The usual observations were made in this fishway which was found to be operating properly. A large number of fish ascended without difficulty.

#### *Monument River*

*Bournedale Fishway.*—Frequent observations were made in the fishway located on the Cape Cod Canal and this was found to be functioning satisfactorily during the run of fish.

#### *Mill River—Sandwich*

Early in the spring the owner of the old mill located at the outlet to Shawme Pond, Sandwich, indicated her willingness to proceed with the installation of a fishway on her property. This is the second instance where the owner of a dam has taken the initiative in complying with State regulations concerning fishways.

A conference was held, a survey of the premises made, and the owner agreed to install a fishway at once along the lines indicated and in a manner which would be satisfactory to this Division. This fishway was in operation during the spring run of fish.

*Cole's River—Swansea*

*Montaup Electric Company Fishway.*—This fishway was inspected periodically during the spring run of fish and while the fishway itself was in operation to permit fish to ascend, there are minor changes still to be made in this fishway to enable fish to surmount without difficulty.

*Herring River—Brewster*

*Herring River, Brewster.*—The owner of the old mill located on Stoney Brook, Brewster, otherwise known as Herring River, early in the spring requested the services of this Division in connection with the installation of the proper type of fishway on his property. A conference was held early in March, a survey made by the Division's engineer, plans and specifications submitted to the owner, and early in April he reported the fishway completed and in operation in sufficient time to enable fish to ascend to the headwaters.

*Robbins Pond—East Bridgewater*

*United Cape Cod Cranberry Company Fishway.*—A new fishway was constructed on the property of the United Cape Cod Cranberry Company at the outlet to Robbins Pond, East Bridgewater, during the early spring, thereby giving the alewives and other anadromous fish a clear passage to and from this pond. The fishway was inspected periodically during the spring run of fish and found to be functioning properly.

## POLLUTION

All pollution problems called to the attention of the Division during the year were investigated and corrected wherever possible.

## PROPAGATION OF FISH AND GAME

## FISH HATCHERIES AND GAME FARMS

*General*

We have followed the plan, laid out some time ago, of making repairs and replacements at the game farms and fish hatcheries, together with such new construction as may be necessary, to put all of our plants in first-class condition before enlarging their productive capacities. There still remains a great deal to do, not only in the upbuilding of these units, but in the purchase of lands which we have carried under lease for some years. In the selection of fish hatchery sites we must go where suitable water is to be found. This often necessitates the building of homes for our superintendents and assistants on account of the lack of housing facilities near such locations.

We have established a definite policy of carrying all our brook trout (except culled stock) through the winter to be liberated in the spring as adult fish; also of either carrying the year's production of pheasants through for liberation in the spring as breeding birds, or to accomplish the same end by turning them over to individuals and clubs to be wintered and liberated. Of the yearlings distributed during the trout distribution periods, 207,889 were six inches and upwards in length, which is the largest distribution of its kind in the history of the State. (See table for complete distribution, in the section on Fish and Game Distribution.)

The reforestation program was continued, as noted under the individual stations, with spruce, Scotch, red and white pine, furnished by the Division of Forestry.

During the course of the year Mr. Arthur R. G. Booth of the Water Laboratories of the State Department of Public Health made a survey and detailed report of the water supplies at our fish hatcheries. We believe that a permanent record, over a period of years, of the analyses of



the water at each hatchery may be useful if at any time we are called on to combat disease.

In line with our plan to have our game farms checked up at intervals by outside authorities, such an inspection was made by Dr. J. C. Graham of the Massachusetts Agricultural College at Amherst. In due course his report was received, including recommendations for consideration in the future operation of these stations.

#### *Amherst Rearing Station*

The 12 x 20 addition to the superintendent's cottage was completed, wiring extended to the new part, and fixtures installed in all the rooms. The entire interior was painted and papered, hot-air heating plant and complete water system installed, including tank and pump, and complete bath room and kitchen sink. A new kitchen range replaced the old one. A new chimney was built, complete system of spouting was added, front porch and rear porch built, and the whole exterior of the house painted. A concrete septic tank was built.

An addition was made to the temporary garage near the house, and a one-ton truck purchased, the first truck we have ever had at this station. Additional grading was done around the superintendent's house and the adjoining grounds.

The large pools, for which the ground was cleared last year were completed up to the point of building the wooden dams. Concrete dams were installed at several points to replace worn-out wooden dams, and the ponds widened and deepened as part of this work.

The posts were set up for a new fence along the grounds bordering on the State road.

As part of a new underground system to take the place of the present open wooden supply troughs, 100 feet of three-inch galvanized iron pipe was laid.

With funds contributed by the clubs (see Acknowledgments) two tracts of land were purchased, and the necessary sum is on hand to take over a third tract on which is a greater water supply than exists on the present hatchery grounds. These purchases were necessary in order that we would have sufficient area to take full advantage of the lay of the land in the utilization of our water supplies. In addition we purchased from Superintendent Horst, certain gravel rights which he had acquired from the Holyoke Street Railway Company in land on the opposite side of the State road from the hatchery. This cleared the title to one of the parcels of land purchased, insured our supply of sand and gravel for an indefinite period, and will facilitate the handling of flood waters which are troublesome each spring. 3,800 trees were planted on various parts of the hatchery grounds from the Forestry Division, and in addition 80 black walnut trees.

*Brook Trout.*—To the 23,702 fingerlings on hand December 1 there were added 3,600 from the Montague Rearing Station and 3,200 from the Sutton Fish Hatchery. 5,632 were lost and 24,870 were transferred to yearlings, and distributed.

96,768 fry were received from the Montague Fish Hatchery. 37,768 were lost and 59,000 reared and transferred to fingerlings. 400 of these were lost, 31,600 distributed, and 27,000 remain on hand November 30.

*Brown Trout.*—The 600 brown trout yearlings on hand December 1 were transferred to adults.

Of the 348 adults on hand December 1 (plus the 600 transferred from yearlings) 220 were lost, 345 distributed (of which 12 went to the Eastern States Exposition, 9 to the Worcester Fair and 24 for display purposes) and 383 remain on hand November 30.

*Loch Leven Trout.*—Of the 9,200 fingerlings on hand December 1 there were 1,200 lost and 8,000 transferred to yearlings. 300 of these yearlings were lost, 7,500 distributed, and 200 remain on hand November 30.



Of the 1,181 yearlings on hand December 1 there were 31 lost and 1,150 transferred to adults. 200 of these adults were lost, and 950 remain on hand November 30.

72,645 fry were received from the Palmer Fish Hatchery, of which 30,000 were lost and 42,645 reared and transferred to fingerlings. 13,085 were lost, 15,560 distributed (60 of these went to the Worcester Fair), and 14,000 remain on hand November 30.

### *Montague Fish Hatchery*

With contributions from the clubs (see Acknowledgments), supplemented by funds from our appropriation, additional grading was completed around the large pools constructed last year. The fourth of this series of four pools was filled in with stone and topped off with gravel and sand to provide a solid bottom. The banks were resodded and a wooden dam installed at the outlet. The remaining area at the lower end of the hatchery grounds was again heavily dynamited to churn out all of the roots and stumps to put it in condition for the construction of additional large pools for growing trout to adult size. A new bed 500 feet long was dynamited in order to throw the brook to one side of the grounds, that its present bed might be used for these pools; the stumps were collected into great piles for burning when dried out; the new bed of the brook was shovelled out to even up the irregularities of the blast; and a start was made in shaping up the grounds for the proposed new pools.

Certain of the large wooden dams were replaced on the back brook, and the adjoining pools improved. On the main brook the banks between the bridge and the main dam were walled up and a new concrete dam installed at about the middle. As part of this work there was considerable filling and grading of the grounds. In the upper section of the main brook a number of small concrete dams were built to replace wooden dams that had rotted out. The banks of some of the pools made by these dams were walled up with stone to prevent a cave-in, due to the springy condition of the grounds.

A number of large stumps on various parts of the grounds were blasted out. The section of the hillside in front of the camp was graded off, as well as the hillside back of the loading stand. The necessary tile was purchased for conducting water from the upper reaches of the main brook down to the large rearing pools at the lower end of the ground.

The camp was completed inside and outside, and painted. Concrete steps were built up to the piazza, and a retaining wall put in at one end of the porch. A garage with concrete floor and sills was built against the rear of the ice and meat house to house the second-hand Reo truck which was transferred from the Sutton Fish Hatchery. To obtain the lumber for the garage an old storage building was torn down and the rear half of the hatchery building was removed. The remaining part of the building was repaired.

11,720 trees were set out (of which 20 were black walnut).

*Brook Trout.*—Of the 100,000 fingerlings on hand December 1 there were 3,600 sent to the Amherst Rearing Station, 31,400 were lost, and 65,000 transferred to yearlings. 60,316 of these yearlings were distributed (16 of these to the Eastern States Exposition), and 4,300 lost, leaving 384 on hand November 30.

Of the 800 yearlings on hand December 1 there were 400 distributed and 400 transferred to adults. 100 of these adults were lost, 7 distributed to the Eastern States Exposition, and 293 remain on hand November 30.

300,000 eggs were purchased and 150,000 received from the Sandwich Fish Hatchery. The total hatch of fry was 383,700, of which 96,768 were sent to the Amherst Rearing Station, 30,232 lost, and 256,700 reared and transferred to fingerlings. Of these fingerlings 17,600 were lost, 145,300

distributed (200 of these to the Eastern States Exposition), and 93,800 remain on hand November 30.

*Rainbow Trout.*—80,000 eggs were received from the Utah Fish and Game Commission in exchange for brook trout eggs. 27,000 fry were hatched and 2,000 reared and transferred to fingerlings, of which 500 remain on hand November 30.

25,000 rainbow trout eggs were received from the U. S. Bureau of Fisheries in May in exchange for brook trout eggs. 20,075 fry were hatched, of which 6,000 fry were lost and 14,075 reared and transferred to fingerlings. 4,075 fingerlings were lost, and 10,000 remained on hand November 30.

4,000 fry were received as a gift from the U. S. Bureau of Fisheries station at Nashua, N. H. 500 were lost, and 3,500 remain on hand November 30.

Of the 9,646 fingerlings on hand December 1 there were 565 lost and 9,081 transferred to yearlings. 4,621 of these were lost, 4,420 distributed (20 of these to the Eastern States Exposition) and 40 remain on hand November 30.

### *Palmer Fish Hatchery*

Superintendent Otis D. Monroe resigned from the service as of May 10, and his son, William F. Monroe, succeeded him.

The superintendent's house was remodelled by tearing away the poorly-constructed ell, building in a new, long window in the dining room, and adding a small porch at the kitchen door. The interior of the house was painted and papered, and the outside painted. The garage also was painted. Minor repairs were made to the Taylor-Huntley house; a new pump installed at the Goodreau house; and new roofing paper put on the shed.

A new loading stand was built, including the piping of water to it, to improve the handling of fish preparatory to and during shipping; and a new loading platform for bass replaced the old, decayed one.

Pond No. 2 was cleaned of mud and vegetation; certain of the bass ponds were filled in with gravel to provide a solid bottom and to insure better drainage when drawn off; three new concrete raceways were built to replace worn-out wooden raceways in ponds Nos. 4, 7 and 8; a new pipe line was installed to connect Ponds Nos. 3 and 7; a new overflow of plank was installed in the new pool; and the banks of certain pools were raised for winter rearing of trout.

During the winter months, all fish cans were given a coat of paint, and during this period much work was done repairing, making and painting screens.

1,500 trees were set out.

*Brook Trout.*—Of the 29,651 fingerlings on hand December 1 there were 18,700 lost or unaccounted for during the winter, and 10,951 transferred to yearlings. 251 of these were lost, and 10,700 distributed.

200,000 eggs were purchased, 100,000 received from the Sandwich Fish Hatchery, and 15,000 collected from wild trout in waters on the hatchery grounds. 27,900 eggs were lost, 5,000 sent out for planting in brooks, and 282,100 fry hatched. Of the fry 200 were given away for study and experiment, 160,000 distributed to local brooks, and 100,000 reared and transferred to fingerlings. 36,517 of these were lost, 21,220 distributed to local brooks (100 of these went to the Eastern States Exposition), 5,000 sent to the rearing station of the Peabody Fish and Game Association, Inc., and 37,263 remain on hand November 30.

*Loch Leven Trout.*—100,000 Loch Leven trout eggs were received from the U. S. Bureau of Fisheries Station at Bozeman, Mont. in exchange for brook trout eggs. 97,094 fry hatched, of which 24,449 were lost and the remaining 72,645 transferred to the Amherst Rearing Station.



*Blue Gills.*—From the supply pond at the hatchery 219 adult blue gills were collected and distributed.

*Horned Pout.*—From the supply pond at the station there were collected and distributed 2,000 fingerling, 1,500 yearling and 500 adult horned pouts. There were received from the Stockwell Ponds 400 adult horned pout, and these are on hand November 30.

*Small-mouth Black Bass.*—There were 414 adults on hand December 1. 37 were lost, 8 sent to fairs (4 to the Eastern States Exposition and 4 to the Worcester Fair and thence distributed). The remainder, plus 80 salvaged from Meeting House Pond, Westminster, make a total of 449 on hand November 30. From the bass ponds there were collected and distributed 165,000 fry and 21,475 fingerlings (of which 95 went to the Eastern States Exposition).

*Wall-eyed Pike Perch.*—500,000 wall-eyed pike perch eggs were received from the U. S. Bureau of Fisheries Station at Swanton, Vt., from which 490,000 fry were hatched and planted.

### *Sandwich Fish Hatcheries*

It is with deep regret that we record the death, on November 16, of Superintendent William M. Monroe. Mr. Monroe entered the State service as assistant at the Palmer Fish Hatchery, and was transferred to the Sandwich Hatcheries on December 1, 1918, succeeding the former superintendent, Frank E. Hitchings. Mr. Monroe represented the best traditions of the fish culturists of the country. He was earnest and successful in his development of these hatcheries, and maintained their production at a high level. No definite decision has been reached as to his successor.

### *Sandwich Fish Hatchery*

The road leading into the hatchery was given a heavy fill of cinders, and the work of widening it begun. A camp, formerly used at the Weymouth Back River, was set up to serve as a dormitory for fish messengers and other temporary help. A supply of lumber from Carr Island was received, for future construction work. A start was made toward the construction of an addition to the meat house.

A 2-inch well was driven, preliminary to constructing a concrete holding pocket to improve the facilities for shipping fish; certain of the concrete pools were repaired by placing in new tie rods running from pool to pool, and re-cemented where the original cement had broken away; racks were built for the pools constructed last year, and additional grading done around these pools.

125 trees were set out.

*Brook Trout.*—Of the 99,888 fingerlings on hand December 1, there were 20,592 lost, 560 sent to the New England Sportsmen's Show (and later distributed to local brooks) and 78,736 reared and transferred to yearlings. 504 of these were lost, 75,083 distributed (18 of these were for display purposes) and 3149 remain on hand November 30.

Of the 3,629 yearlings on hand December 1 there were 54 lost, and 3,575 transferred to adults. These, plus the 3,371 on hand December 1, made a total of 6,946 handled during the year. 3,940 were lost, 1,406 distributed (6 for display purposes), and 1,600 remain on hand November 30.

1,375,000 eggs were collected from station stock and 25,000 wild brook trout eggs were received from the U. S. Bureau of Fisheries Station at Berlin, N. H. in exchange for brook trout eggs. Fifty-three thousand eggs were lost; 50,000 were sent to the California Fish and Game Commission in return for the Chinook salmon eggs furnished the East Sandwich Fish Hatchery; 50,000 to the Utah Fish and Game Commission in



return for the rainbow trout eggs furnished the Montague Rearing Station; 290,000 to various U. S. Bureau of Fisheries stations in return for the Loch Leven trout eggs furnished the Palmer Fish Hatchery, the wild trout eggs furnished the Sandwich Fish Hatchery, the rainbow trout eggs furnished the Montague Fish Hatchery; 150,000 to the Montague Fish Hatchery; 100,000 to the Palmer Fish Hatchery; and 707,000 fry were hatched. Of these 148,000 were lost, 35,000 distributed to local brooks, 129,000 transferred to the East Sandwich Fish Hatchery, and 2,000 sent to the New England Sportsmen's Show (and later distributed), and 393,000 reared and transferred to fingerlings. 25,290 fingerlings were lost, 96,000 sent to the Sutton Fish Hatchery, 9,000 sent to the East Sandwich Fish Hatchery, 25,000 to the rearing station of the Peabody Fish and Game Association, Inc.; 25,000 to the station of the Canton Fish and Game Protective Association, 60,000 to the station of the Worcester County Fish and Game Association, 52,800 distributed to public waters, and 99,910 remain on hand November 30.

#### *East Sandwich Fish Hatchery*

The kitchen of the Nye house was torn down and the new one built on a concrete foundation. The front of the porch was shingled to correspond with the house, and a rock foundation placed under this end of the porch.

The banks of a number of the rearing pools were cut down, and sodded. By these changes there will be no overhang of the banks, thus making it possible to remove planks that formerly had to be kept in position to prevent the banks from sagging in. This not only improved the appearance of the pools, but also the conditions for rearing fish.

The grounds were further drained, unused pools filled in, and additional grading completed.

An old shed used during the egg-taking period for storage was removed and the location graded off.

1800 trees were set out.

*Brook Trout*.—Of the 33,469 fingerlings on hand December 1, there were 80 lost and 33,389 transferred to yearlings. 106 yearlings were lost, and the remaining 33,283 distributed.

Of the 3,596 yearlings on hand December 1 there were 79 lost, 875 distributed, and 2,642 transferred to adults. 180 adults were lost and 2,462 distributed.

328,500 eggs were collected, of which 64,650 were lost, 42,000 sent to the New England Sportsmen's Show (afterwards planted), and 221,850 hatched into fry. To these were added 129,000 fry from the Sandwich Fish Hatchery. 3,600 were lost, 235,000 distributed to public waters, 112,250 reared and transferred to fingerlings. To these fingerlings were added 9,000 from the Sandwich Fish Hatchery. 25,000 were sent to the rearing station of the Wrentham Fish and Game Association, 5,000 distributed to public waters, 47,600 were lost, and 43,650 remain on hand November 30.

*Chinook Salmon*.—50,000 eggs were received from the California Fish and Game Commission in exchange for brook trout eggs. 48,550 fry were hatched, of which 1,150 were lost and 47,400 reared and transferred to fingerlings. 498 fingerlings were lost, 12,000 distributed to public waters, 30,000 sent to the rearing station of the Dighton Fish and Game Club, and 4,902 remain on hand November 30.

#### *Sutton Fish Hatchery*

The old single pipe hot-air heater in the residence on the grounds was replaced with a new steam-heating system.

The road leading into the hatchery was filled in and graded in places, following damage by flood which washed out the road and destroyed fences.

The camp and office buildings, ice and meat house buildings were painted and minor repairs made.

A new gasoline tank and pump were installed.

A one-ton White truck was purchased to replace the well-worn Reo speed wagon, and a half-ton Chevrolet truck for light trucking in connection with the pond work.

7,500 trees were planted. 1,500 black walnut trees were grown from seed planted in 1926, and more seed collected and planted in 1927 to give expected yield of 1500 to 2000 trees.

*Brook Trout.*—The year opened with 30,000 fingerlings on hand recorded in the last report, plus 4,700 discovered over the previous count. 3,200 were sent to the Amherst Rearing Station, 1,500 distributed to public waters, and 30,000 reared and transferred to yearlings, and distributed.

The 200 yearlings on hand December 1 were lost.

96,000 fingerlings were received from the Sandwich Fish Hatchery, 51,000 of which were lost, 10,000 distributed to public waters, and 35,000 remain on hand November 30.

*Pheasants.*—Of the 300 young pheasants on hand December 1 there were 122 lost and 178 distributed as adults.

#### FIELD PROPAGATION

We have established a definite policy of producing around 225,000 trout of all species in the spring, large enough to be caught when planted. This plan will be adhered to until such time as we can have in operation, pond cultural units for the production of a much larger supply of pickerel, horned pout, perch, blue gills, etc. for the stocking of our great ponds. For many years we have more or less concentrated on the production of trout and the time has come when we should hold that work at about the present volume and go forward with very substantial developments to produce more fish for restocking the over 800 great ponds in which free fishing is guaranteed to our people forever.

*Stockwell Ponds Unit.*—The fill across the face of the dam at the Arnold Pond was completed and a stone wall built around the upper end of the flume. Another stone wall was partly laid across the lower end of the flume and the general fill on the dam to level it off was nearly completed. The ditches in the Arnold Pond were cleaned out to insure complete drainage and more rapid movement of the fish when the pond is drawn down.

The new dam for which contributions were made by the clubs (see Acknowledgments) was started across the center of Middle Pond. When completed it will be 235 ft. long and 9 ft. high. Stone to keep the fill from spreading was placed in position last winter and spring. A wooden core was built, together with a flume 12 feet wide and 9 feet high, with a concrete bottom. At the base the fill will be 18 feet wide and on top, when the dam is completed, 8 feet. A track was built on top of the core and dump cars used on the fill, which was taken from two points on high ground on either side of the dam. Owing to the lack of funds the fill could be carried only up to the height of 6 feet, but this was sufficient to insure carrying a greater depth of water than ever before in the upper part of Middle Pond during the coming winter. Eventually, when the dam is completed, approximately 25 additional acres of land will be placed under water and the height of the water in the upper part of this pond will be raised at least 6 feet. The work so far has been financed by the \$405 expended from the club contributions, \$350 from the Division's appropriation, and by the payment of bills amounting to \$75 by the town of Webster (to make use of the town's funds appropriated to stock Webster Lake).

An additional concrete flume was constructed in the Putnam Mill Pond to assist in more rapid drawing off of the ponds each fall to remove the stock and as a further protection against flood conditions.



During the winter additional trees and brush were removed from the land to be flowed. There were 1500 trees (Austrian pine, white pine, and spruce) from the Forestry Division planted on the cleared margins of Stockwell Ponds.

The work of drawing off the ponds was not completed in 1926, owing to frequent rains, winter setting in early, and the arrangements for doing the work being not then fully developed; but the fish left were concentrated in Pond No. 1, and early in April, 1927, this pond was drawn, yielding fully 70,000 fish, mostly yearling horned pout, and an ample brood stock that was distributed in the three ponds.

The work for 1927 was started in August by drawing the Sutton Pond into No. 3, and although the work was done in warm weather and the fish had to be run down the rocky bed of the brook, making a descent of about 100 ft., this was done with slight loss, establishing the practicability of taking the fish from the remote Sutton-Thompson Ponds in the traps at the Stockwell Ponds.

In September Pond No. 2 was partly drawn to uncover the bottom and start work at the new dam; and following this, No. 1 was drawn to remove for distribution, some of the excess fish that went into it from No. 2, and to guard against crowding when the regular drawing off, beginning with No. 3, was started.

This work was undertaken early in October when the work on the dam was advanced so that No. 2 could be partly refilled, and although greatly delayed by excessive rains, was completed about November 30.

Pond No. 3 was unfinished when a heavy rain refilled it on October 13, but was again drawn and finished before the flood of Nov. 4. This flood filled all the ponds to a high level, requiring a week of heavy flow to get them down to a working condition, which was again interrupted by a heavy rain November 18; but by this time the new dam could be used for holding water back, and the work was satisfactorily completed.

While the season was the most extreme for high water that could be expected at any time, the work was finished at not much later than the normal time, and it can be considered that the system has been sufficiently developed with run-off and storage facilities to carry the work through under any conditions of unseasonable weather. Any further development of ponds will improve the conditions for handling fish more in proportion than it will increase the work.

The greatest damage from the delay caused by the flood conditions, seemed to come from holding the fish concentrated in limited areas, where the larger ones could feed freely on the smaller ones, and ample evidence was found that the larger ones were continually gorged, with the loss falling mostly on fingerling pickerel, and fingerling or yearling blue gills, the brood pickerel showing an especial preference for yearling blue gills. This condition was in part due to holding the water at a low stage for work on the dams, and can be regarded as easily avoidable when drawing down and completing each pond in turn, by starting from the head of the system.

The brood stock sorted out and returned to the ponds as the work progressed consisted of pickerel, horned pout and blue gills, 1,500 to 2,000 to each pond, except that the proportion of pickerel was increased and some horned pout were reserved for any new pond that might be completed early in the next season.

Distributions from the ponds for the period of this report (December 1, 1926 to November 30, 1927) were: 93,700 blue gill fingerlings; 2,605 blue gill adults (40 to Eastern States Exposition and 40 to the Worcester Fair); 6,220 horned pout fingerlings (20 to the Worcester Fair); 97,465 horned pout yearlings and adults (45 to the Eastern States Exposition, 20 to the Worcester Fair); 1,100 pickerel fingerlings; 1,956 pickerel adults (3 to the Worcester Fair and 3 to the Eastern States Ex-



position); 6,100 yellow perch fingerlings; 940 yellow perch yearlings and adults (4 to the Eastern States Exposition and 36 to the Worcester Fair); 1 adult small mouth black bass to the Worcester Fair; 75 adult sunfish to the Worcester Fair. In addition there were 500 horned pout yearlings and adults sent to the U. S. Bureau of Fisheries at Hartsville for experimental purposes, and 400 to the Palmer Hatchery for additions to the brood stock.

*Sutton-Thompson Unit.*—The enlargement and development of the pond cultural work in this vicinity was substantially advanced. A tract of 26.5 acres was leased from the town of Sutton, and 34.4 acres (adjoining the Sutton tract) were leased from George H. and Mamie F. Thompson. These leases are for five-year periods, with an option of purchase at fixed prices. The acquisition of these properties will permit of the enlargement of a ten-acre pond lying partly on each tract. Also the construction of an additional fifteen-acre pond on the Thompson tract, and, later on, the construction of an additional five-acre pond on the Sutton tract. Both properties were surveyed.

The dam on the Sutton tract was repaired by the construction of a new concrete overflow, the old flume torn out and replaced with concrete, and leaks in the dam stopped. A concrete flume was built on the side of the dam to be built on the Thompson property, and a pipe laid to connect this pond with the Sutton pond. A stone wall was laid on one side of the proposed Thompson dam, and a sufficient amount of fill made to flow the area of the Thompson Pond to facilitate the removal of all trees and brush, preparatory to raising the dam and deepening the pond.

*Welsh-Sullivan Unit.*—An area of 27.47 acres was leased from David J., Mary R., Kate E., and Elizabeth B. Welsh, and 12 acres adjoining from Grace E. Sullivan, which will permit of the construction of a dam placing 20 acres under water. The leases covering these properties are also for five-year periods and with an option of purchase at fixed prices stated in the leases. Surveys of the several parcels making up this tract were also made.

#### AYER GAME FARM

Each year's developments bring us nearer to the operation of this station as a game farm throughout the entire year. Originally we maintained there a stock of adult birds from which eggs were shipped to individuals and clubs for hatching—in line with our desire to send out to the public as good quality eggs as are used at our own game farms. This year, for the first time, the farm was operated throughout the entire year. After the egg-stock was distributed there was much work done growing crops, moving the pens on to new ground, and preparing for the next crop of young birds to be reared through the winter for the 1928 egg-stock. Additional fruit trees and grape vines were planted, particularly around the edges of the large swamp, which eventually will make a splendid area within which to carry birds through the winter. Good crops of corn, oats and clover were harvested, to be part of the coming winter's food supply. Out-door hoppers for the handling of scratch grain and mash were constructed along special designs, that proved very satisfactory.

A temporary dam was placed on the never-failing brook which runs through the property, which flowed a pond of five acres. This pond, when completed, will be a fine addition to the farm, not only for the growth of pond fish, such as pickerel and horned pout, but as a part of a sanctuary for wild fowl.

A survey of the farm was completed and permanent markers set up. 1400 trees were planted.

*Pheasants.*—There were 426 adults on hand December 1, to which were added two re-captured escapes and 3 adults from the East Sandwich Bird Farm. Of these 23 were distributed prior to the laying season and 10 were lost, leaving 398 on hand at the beginning of the laying season.

From this egg stock were collected 15,049 eggs, of which 13,444 were sent to clubs and individuals for hatching. 590 were sent out of the State, 12 to the Peabody Museum, and 343 used for feeding the young pheasants. 660 were set in incubators in experimental work, from which 6 birds survived.

To the 398 egg-stock on hand at the beginning of the laying season were added 13 imported birds from the Wilbraham Game Farm. 292 were distributed to clubs and individuals, 79 were lost, and 40 remain on hand November 30.

In order to relieve crowded conditions at the East Sandwich Game Farm 504 young pheasants were received at the Ayer Station for later distribution. From the same station there were received 200 for the 1928 egg stock, and from the Wilbraham Game Farm 199 for the egg stock. 40 of these birds were sent out to be wintered and 217 were lost. The remaining 646 (plus the six from the experimental work), give 652 on hand November 30.

### *East Sandwich Bird Farm*

Pens adjoining the new brooder house were built and this unit was operated to capacity for the first time.

A substantial part of the period which is ordinarily devoted to new construction was used to trap up the brood stock of quail with which the breeding of such birds was resumed in the spring.

The old breeding pens for quail were revamped and used, although in a dilapidated condition. A new pen for the wintering of quail was constructed, 48 x 80 feet. The baseboards were carried higher than would be required for pheasants and much smaller wire used throughout. The pen is sub-divided into four separate sections, each 12 x 80 ft. The pen was built around and through a plantation of dwarf pine trees which will supply much natural cover. One of four concrete bases was put in upon which will be located wintering houses adjoining each section. All chimneys to the brooder houses were repaired. A small incubator for the handling of quail eggs was purchased. A stock of second-hand lumber from Carr Island was delivered on the ground for use in future pen construction.

The available territory for the breeding of game birds was greatly increased by the addition of the large tract adjoining the game farm (the Hoxie property, so-called), purchased by the Associated Committees for Wild Life Conservation which is more fully dealt with under Acknowledgments. The new quail pen was located on this ground.

A very serviceable two-room camp, previously located on the Boxford Reservation, was brought to the station and placed on a high piece of ground.

There were 2,000 trees received and set out, besides the 2300 received last fall and heeled in until spring.

*Pheasants.*—The 1,124 adult pheasants on hand December 1 were reduced by losses of 231, distribution of 340, and shipment of 3 to the Ayer Game Farm, to 550 at the beginning of the breeding season.

15,124 eggs were collected and set, and 8,723 young birds hatched. 4,911 of these were lost and 3,812 reared. Of these, 2,298 were sent to fish and game clubs and individuals for wintering, 430 distributed, 704 sent to the Ayer Game Farm (504 of them were for later distribution and 200 for 1928 egg stock), leaving 380 of the 1927-hatched stock on hand November 30.

Of the 550 adults on hand at the beginning of the breeding season 76 were lost and 293 distributed. To these were added 10 received from the Wilbraham Game Farm, so that 191 remain on hand November 30.

*Quail.*—During the winter 77 adult quail were trapped. This flock was reduced prior to the breeding season, by loss or escape of 7 and the distribution of 6 surplus cocks, to 64.



The work of the breeding season started with 32 evenly mated pairs. For several reasons they were not paired off and placed in their quarters until rather late in the season, with resulting delay in egg-laying which has a tendency to produce poorer results than otherwise.

374 eggs were collected and set.

Great variation was noted in the individual results. 11 pairs did not produce any eggs at all throughout the season, and the above 374 eggs were collected from the others, making the average about 18 eggs to each laying hen. Some few eggs, besides those collected, were destroyed by chipmunks.

It was planned to set most of the eggs under bantams, but the latter held off from setting, with the result that many of the quail eggs became too old for good results. Eventually about three-quarters of the eggs were placed in the small incubator which had been intended for use only for experimental purposes; but because of the age of the eggs, poor hatching resulted. One lot of 30 came off at one time and the chicks were placed in an apartment in the hot-water brooder house used for young pheasants. 16 of this lot were reared to maturity. Other lots were hatched and given to bantams later, with varying results.

Out of the 374 eggs there was a total hatch of 98 young quail, of which 59 were lost and 39 remain on hand November 30.

The same characteristics were noticed in work with the wild trapped birds as had been observed in the work with quail in former years, namely, the tendency to start late in laying; the non-producing females; and the relatively smaller number of eggs laid per hen.

Of the 64 adults on hand at the beginning of the breeding season 12 were lost and 52 remain on hand November 30.

#### *Marshfield Bird Farm*

Considerable time of the superintendent was occupied, during the early winter, in constructing the necessary pens and assembling the equipment to house our exhibit at the New England Sportsmen's Show held in Boston in January.

A large brailling yard, to include 9 acres of swamp and upland, was constructed. The fence is 9 feet high, the lower part made of boards and wire sunk into the ground. A two-foot wire around on top has been added. One section of the yard was wired off to carry the brood stock through the winter, and shelters constructed. Within this enclosure a large catching pen was built, to facilitate the handling of young stock which will be reared in the large yard during the summer and fall.

The small camp previously used in the smelt work on Weir River was set up and used this year to house a watchman who volunteered his services free of charge. This camp was set on a new foundation, reshingled, finished inside with beaver board, equipped with stove, and otherwise made comfortable.

A new well was driven and equipped with pump, and repairs were made on the water system. The house formerly used for fancy pheasants was moved to a new base, and the framework for adjoining pens put into position to use for the breeding of ring-neck pheasants. A substantial amount of grading and filling was done around these pens.

The roof of the small brooder house was re-shingled. Additional drainage tile was placed.

About half the 2,000 trees received from the Forestry Division and heeled in during 1926, were set out during the year, the remainder being held to plant later on new land now being built.

*Pheasants.*—The year opened with 1,424 adult pheasants on hand, to which were added 133 imported from England. 216 of these were distributed in December, 1926, to clubs and individuals for wintering, 635 were distributed for liberation, 10 distributed outside the State, and 122



lost or unaccounted for, leaving 574 on hand at the beginning of the breeding season.

14,924 eggs were collected and set in incubators, and 6,767 young birds hatched. About the middle of May an epidemic of some unknown disease attacked the young birds, and about this same time it was observed that the brood stock appeared to be sluggish and inactive. The young birds died off in large numbers from the first to the tenth day after hatching. Every precaution was taken to prevent this heavy mortality, but without results. Independent scientists, all authorities on bird culture, were consulted on the problem of this disease, and they either personally visited the farm, made observations on live specimens sent to them, or autopsied dead specimens. The reports of their findings varied to such an extent, that it was impossible to arrive at a definite conclusion as to the true cause of death. It was finally decided and agreed, however, that it would be safe to liberate the entire brood stock in October or as soon as possible thereafter, in addition to all the young stock which had escaped the disease and been reared. It appeared advisable to liberate all of these birds in wild country, at a distance from farms and poultry plants. The losses from this epidemic among the young birds totalled 6,366, and only 401 were reared. 9 of those were sent away for scientific examination, 312 were distributed, and 80 remain on hand November 30.

There were 574 adults on hand at the beginning of the breeding season. Of these 482 were distributed for liberation, 50 died as a result of the epidemic, and 42 were sent away for pathological examination. In the early fall 416 adult pheasants were received from a commercial dealer, to be used as new brood stock at the farm next spring. Five of these died, leaving 411 on hand November 30.

As a precaution against a reappearance of the disease, the 84 brood pens from the orchard were taken down, sterilized thoroughly, rebuilt, and painted, ready to be placed in a new location in the spring. The orchard was plowed, limed and harrowed. Some of the top soil of the pens was taken off to the depth of a shovel blade, as recommended, and the dirt carried out and dumped to use for filling near the land of the railroad company. All the gardens were cleaned up and plowed ready for spring work.

#### *Sutton Hatchery*

For report of pheasants carried over from last year, see end of Sutton Fish Hatchery report.

#### *Wilbraham Game Farm*

A new roof was placed on the cottage located at the Reader tract, a new porch built and the inside of the house painted and papered. A new roof was put on the barn adjacent to this house, the adjoining shed torn down, and all out-buildings painted—all of which greatly improved the appearance of the place. Repairs were made in the superintendent's house. The upper tenement was re-wired and a separate meter installed, and toilet put in. The floor of the stalls in the barn was lined with copper sheeting and an iron trough attached to drain the stalls out through the side of the barn into a cess pool, in order to keep clean the entire basement of the barn, part of which is used as an incubator cellar and part for general storage.

Additional shrubbery and ornamental trees were planted, and 1000 trees set out.

*Pheasants.*—The 820 adult pheasants on hand December 1 were increased by 141 purchased birds from England. 318 were distributed to clubs and individuals, 64 were lost, 13 sent to the Ayer Game Farm, 10 to the East Sandwich Bird Farm, leaving 556 on hand at the beginning of the breeding season.

20,826 eggs were collected, of which 20,667 were set in incubators and 10,118 young birds hatched, of which 1,554 were reared. 200 (one of

which was lost in transit) were sent to the Ayer Game Farm for 1928 egg-stock, 1,085 sent out to be wintered, 8 were liberated and 38 stolen from the pens, leaving 223 on hand November 30.

Of the 556 on hand at the beginning of the breeding season 308 were liberated, 51 lost or unaccounted for, and 197 remain on hand November 30.

## FISH AND GAME DISTRIBUTION

### FISH DISTRIBUTION

The problem still remains of an adequate fish distribution system. At present the distribution of the output from the hatcheries is accomplished, in most cases, by shipment by rail to a designated railroad station, where the fish are turned over to the distribution committee of a local club, or to some individual. A considerable number of fish are also taken out by hatchery trucks, and trucks provided by the sportsmen's associations. The shipments via our own trucks are planted by, or under the direction of, one of our employees in the presence of the applicant or his representative; but in the rail shipments we are unable to superintend the actual planting in the waters, owing to the large number of shipments in a given year, and the necessity of our wardens being on other work. We again stress the need of a sufficient number of fish messengers and fast-going, rugged trucks to enable us to transport all fish from the hatcheries and plant them. While each receiving agent is handed a poster containing full instructions for caring for and planting the fish, we believe that many shipments are still handled unsatisfactorily.

The total expenditure for fish distribution was \$3887.65. Tables showing details of the distributions appear at the end of the section, to which reference is made to supplement the following reports on the individual species.

*Brook Trout.*—Our present policy is to plant only fish large enough to be legally caught; but, when crowded conditions in the trays or pools necessitate thinning out the stock to insure sufficient growing room, the discarded stock is distributed as a by-product. In this way there were distributed to public waters, 47,000 eyed eggs which were planted in feeder brooks, 432,000 fry and 267,980 fingerlings. In addition, 170,000 fingerlings were sent to the rearing stations of certain clubs for growing to larger size and subsequent distribution, and 336,623 were held at all the stations to be grown to yearlings for spring distribution. The total distribution of yearlings was 235,603 and of adults, 3,882 with 3,533, yearlings and 1,893 adults on hand at the stations at the close of the period of this report.

The experiment in stocking certain ponds (landlocked, or with screened outlets) with large trout, was continued and stock placed in the following ponds: Onota Lake, Pittsfield; Congamond Lakes, Southwick; Baptist Pond, Chelmsford; Lake Archer, Wrentham; Lake Attitash, Amesbury. Further stockings will be made as suitable fish become available.

*Brown and Loch Leven Trout.*—Our distribution of brown and Loch Leven trout was confined to specially selected waters which have been found, after careful investigation, to be suitable for this species. The year closes with 14,000 fingerlings, 200 yearlings and 1,333 adult brown trout and Loch Leven trout on hand.

*Rainbow Trout.*—Last year the entire production of rainbow trout fingerlings was retained for work at the station. During this year there were 4,420 of these distributed as yearlings in specially selected waters. Of the present year's production there remain 14,000 fingerlings on hand and 40 yearlings.

*Chinook Salmon.*—The Chinook salmon raised at the East Sandwich Hatchery were disposed of by plants of 12,000 in Peters Pond, Sandwich, Ashumet Pond, Falmouth and Mashpee, and Bloody Pond, Plymouth,



allotment of 30,000 to the Dighton Fish and Game Club rearing station for further rearing and distribution, and 4,902 remain on hand.

*White Perch.*—The adult white perch salvaged from Tashmoo Pond were used this year exclusively for stocking the ponds under 20 acres and other private waters, the owners of which had agreed to permit the public to fish therein for a period of years, in order to bring them within the requirement of the license law (see Ponds.)

*Work of the Salvage Unit.*—While we were able to handle several salvage jobs over and above the work of any previous year, we repeat—that this work is only in its infancy. It consists in using an outfit of stationary traps to catch up fish in water supplies closed to public fishing, and liberating them in open water. The work was greatly facilitated this year by the addition of a new one-ton White truck for carrying the gear from point to point, and for transporting heavy loads of fish. The fish trapped are adults. They are carried in 40-gallon cans, and, because of their size and the time of year collected, they can be transported only short distances. Therefore in salvage work only waters near the scene of operations can be stocked. We should have at least five such salvage crews to work each year, starting when the ice goes out in the spring and continuing until warm weather and the pond vegetation stop the work. Activities would be resumed in the fall and continue until freeze-up time. The salvage system and the pond-cultural units offer the only attractive methods of providing a suitable stock of pond fish. The main salvage jobs were carried on at Tashmoo Pond on Martha's Vineyard; Wenham Lake, Wenham; General Butler Ames Pond, Tewksbury; and Long Pond, Falmouth.

Most of these salvage jobs in the future will be in the municipal water supplies. In order that the public health should be properly safeguarded (in past jobs) each member of the salvage crew was cultured by the State Department of Health and certified as a non-typhoid carrier. They were instructed to observe (and did observe) the following sanitary precautions as outlined by the Department of Health—

To keep as far as possible from the "intakes" (that is, the points through which the water is distributed to the consumers); to see that the traps and other gear which come in contact with the water are handled only by those men who have been certified by the Department of Health; to set out traps to dry only on ground which is entirely free from pollution; to observe the strictest sanitary precautions in their personal habits, both on the watershed and in the water itself; to permit no fishing in the pond; and to rigidly exclude all persons from the locations on the watershed where the gear, trucks, cans, etc. are handled.

Salvage operations started in Tashmoo Pond, Martha's Vineyard, and continued there from March 26 to May 2. 80,250 adult white perch were collected and distributed.

In May the gear was transferred to Long Pond, Falmouth (a water supply closed to public fishing) for salvage work by request of the town officials, who paid all expenses as was done last year. The salvage crew collected 1,200 adult small-mouth black bass, 2,000 adult yellow perch, 250 adult horned pout, and 50 adult white perch. These were distributed in ponds in Falmouth open to public fishing.

From June 22 to 25 the work was continued in Wenham Lake, the expense being defrayed by funds raised by the North Shore Rod and Gun Club (see Acknowledgments). There were collected, 2,920 adult white perch, 549 small-mouth black bass adults and 184 pickerel adults, which were planted in local waters open to public fishing.

From June 3 to 10 the work was carried on at the General Butler Ames Pond in Tewksbury, from which there were taken 1,830 small mouth black bass adults, 3,910 calico bass adults, 350 horned pout adults, 1,160 blue gill adults, all of which were distributed to public waters. The



salvage crew also collected 50 small-mouth black bass adults and transferred them to the small pond of General Butler Ames.

Several small salvage jobs were accomplished, and the fish planted, for the most part, locally:

By wardens: from Meeting House Pond, Westminster, 258 small mouth black bass adults; from City Farm Pond, Fitchburg, 1,000 horned pout fingerlings; from Prospect Pond, Taunton, 300 adult white perch.

By John H. Tarment of the Foxboro Fish and Game Association, from the private pond of E. H. Bristol of Foxboro, 3,750 horned pout yearlings, 1,489 horned pout adults, 950 pickerel yearlings, and 83 pickerel adults. In exchange for the fish taken last year from this pond there were 600 yearling brook trout given from the Sandwich Fish Hatchery.

Under authorization from this Division eight members of the Fall River Rod and Gun Club took, with hook and line, 2,152 adult small mouth bass, 6 pickerel adults and 10 white perch adults from North Watuppa Pond (a water supply) and planted them in South Watuppa Pond (which is open to fishing).

Under authorization from this Division the Holyoke Fish and Game Club seined from the Holyoke Cove and the South Hadley Cove of the Connecticut River, 18 yellow perch adults, 1 bass fingerling, 18 pickerel yearlings and 8 horned pout fingerlings, and planted them in the Hampton Ponds in Southampton and Westfield.

*Small-mouth Black Bass.*—The small-mouth black bass distribution was conducted on the plan of last year—that is, planting in a few specially selected waters rather than an indiscriminate distribution. Following are the ponds which received stock: Windsor Pond, Windsor; Richmond Pond, Richmond and Pittsfield; Lake Buel, New Marlboro; Lake Rudd, Becket; Lake Attitash, Amesbury; North Pond, Orange; Leverett Pond, Leverett; Congamond Lakes, Southwick; Lake George, Wales; Water-shop Pond, Springfield; Forest Lake, Palmer; Goshen Reservoir, Goshen; North Pond, Hopkinton; College Pond, Carver; Boot Pond, Plymouth; West Pond, Plymouth; Webster Lake, Webster; Little Pond, Bolton; and Long Pond, West Rutland.

*Muskallunge.*—In May there were received from the State of New York, as a gift, 25,000 muskallunge fry in the yolk-sac stage, in excellent condition. These fry were planted in the Connecticut River at Turners Falls, by scattering them thinly in the weedy beds in six to eight feet of water, over the best breeding grounds in Barton's Cove.

*Horned Pout, Blue Gills, Pickerel and Yellow Perch.*—As usual the stock distributed consisted of the product of the Stockwell Ponds, the Palmer Hatchery, and various salvage jobs.

*Alewife.*—The following depleted breeding grounds were stocked with adult alewives, collected in streams where they were running in good numbers: Monponsett Lake, Halifax, 450 in the west lake and 345 in the east lake; Nippinicket Pond, Bridgewater, 670; Town River, West Bridgewater (just above the Stanley Iron Works fishway) 130; Robbins Pond, East Bridgewater, 499. Total, 2,094.

*Miscellaneous Distributions.*—At the close of the New England Sportsmen's Show the following exhibitors turned over to us for disposal, the stock which had been on exhibition. This was planted in waters near Boston. From the State of Vermont, 100 brown trout fingerlings (3 in.); 11 brown trout yearlings; 9 brown trout adults; 9 landlocked salmon adults (8 to 9 in.); 16 lake trout fingerlings (3 in.); 15 lake trout yearlings (8 in.); 16 brook trout yearlings (7 in.); 7 brook trout adults (8-10 in.); 25 lake trout fingerlings (3 in.) From the U. S. Bureau of Fisheries, the State of New Hampshire and the State of Maine, 60 brook trout yearlings (5-9 in.).

	Product of State Hatcheries	Not Hatch- ery Product (seining, gift, purchase, etc.)
Brook Trout:		
Eggs <sup>1</sup>	— <sup>1</sup>	—
Fry <sup>2</sup>	— <sup>2</sup>	—
Fingerlings	267,980	—
Yearlings (under 6 inches)	27,638	—
Yearlings (over 6 inches)	207,889	76
Adults	3,875	7
Brown Trout and Loch Leven Trout:		
Fingerlings	15,560	100
Yearlings	7,500	11
Adults	345	9
Rainbow Trout:		
Yearlings	4,420	—
Chinook Salmon:		
Fingerlings	12,000	—
• Small-mouth Black Bass:		
Fry	165,000	—
Fingerlings	21,475	—
Yearlings	—	—
Adults	9	3,837
Horned Pout:		
Fingerlings	8,220	1,000
Yearlings	1,500	3,750
Yearlings and adults mixed	97,965	—
Adults	—	2,089
Yellow Perch:		
Fingerlings	6,100	—
Yearlings and adults, mixed	940	2,000
White perch:		
Adults	—	83,520
Blue Gills:		
Fingerlings	93,700	—
Yearlings	2,605	—
Adults	219	1,160
Pickrel:		
Fingerlings	1,100	—
Yearlings	—	950
Adults	1,956	267
Wall-eyed Pike Perch:		
Fry	490,000	—
Calico Bass:		
Adults	—	3,910
Sunfish:		
Adults	75	—
Alewives:		
Adult	—	2,094
Miscellaneous Species:		
Lake trout fingerlings	—	41
Lake trout yearlings	—	15
Landlocked salmon adults	—	9
Muskallunge fry	—	25,000
	1,438,071	129,845

<sup>1</sup> 15,000 eggs were planted in brooks to hatch, and 42,000 others planted after exhibition at the Sportsmen's Show.

<sup>2</sup> 432,000 fry were distributed as a by-product.

*Fish Distributed to Clubs for Rearing to Larger Size Before Liberation*

Trout fingerlings (1½ to 2 inches):	
Peabody Fish and Game Association	30,000
Canton Fish and Game Association	25,000
Worcester County Fish and Game Association	60,000
Wrentham Fish and Game Club	25,000
Chinook Salmon Fingerlings:	
Dighton Fish and Game Club	30,000
	<hr/> 170,000

## GAME DISTRIBUTION

*Pheasants.*—For a number of years we have distributed pheasant eggs to individuals and clubs for hatching. Likewise we have stocked, with small fish, the several small rearing stations operated by clubs for the purpose of rearing the fish to larger size before liberation. This was pioneer work in educating the sportsmen and fishermen to help themselves. As a result, the requests for pheasant eggs have continued to increase, year after year, to the point where this year we could not supply the demand, although there were 13,444 eggs shipped out. From these there were hatched 5,916 pheasants, of which 2,545 reached the age for liberation (of these 238 were carried through the winter).

Three years ago we inaugurated the policy of asking individuals and clubs to carry the annual output of young birds produced at the game farms, through the fall and winter to be liberated in the spring as adult birds. From a very small beginning this work has so enlarged that this year practically the entire output of our game farms is now thus housed and being carried through the coming winter, without expense to the State. The superintendents of our game farms are unanimous in the opinion that better results will come from liberating these birds in the spring, shortly prior to the breeding season, than to let them go in the late summer and fall at the age of ten or twelve weeks.

While it is a question whether the maximum results are received from the eggs and young fish sent out, we believe that the educational returns are so great that we are proceeding slowly in abandoning any portion of the work.

We have continued to band all adult pheasants liberated from the game farms, keeping rather elaborate records. We are slowly building up returns that may, upon analysis, throw some interesting light on the extent to which these birds travel.

The total number of pheasants distributed was 750 young and 2,869 adults, with 3,423 being wintered as above described, and 1,335 young and 839 adults on hand at the State game farms.

*White Hares.*—As usual, white hares were imported from Maine and liberated. But again we were disappointed in the extent to which our orders were filled. So much depends on weather conditions that the shippers cannot make any guarantee as to delivery. The distribution period extended from December 27, 1926 until March 28, 1927. Only 1,186 hares were received (of which 326 were imported after the season closed). One or two of the clubs put their quotas in pens and carried them quite successfully, liberating them after the shooting season had closed. From the colony on Penikese Island 24 white hares were distributed. Experiments in the breeding of white hares in semi-captivity, and the discovery of methods by which they can be trapped and carried in captivity for periods of two or three months, offer an interesting field for experiment.

*Cottontail Rabbits.*—The only cottontails distributed were the 240 trapped on Penikese Island.

The cost of game distribution was \$1,210.74.



*Game Distributed to the Covers, 1927*

	Product of State Hatcheries	Not Hatchery Product (Pur- chase, gift, etc.)
Quail:		
Adult	6	—
Pheasants:		
Eggs <sup>1</sup>	— <sup>1</sup>	—
Young	750	—
Adult	2,869	—
Cottontail Rabbits:		
Adult	240	—
White Hares:		
Adult	24	1,186
	3,889	1,186

<sup>1</sup> 13,444 pheasant eggs were distributed for hatching and subsequent distribution.

*Pheasants Distributed to Clubs and Individuals to be Reared to Adults  
for Spring Liberation*

Adults (1926 hatch) carried through the winter of 1926-7 by 2 clubs and 2 individuals	216
Young (1927 hatch) to be carried through the winter of 1927-8 by 55 clubs and 4 individuals	3,423

## MARINE FISHERIES

### GENERAL

It is a great satisfaction to record an increased interest on the part of the government and the public at large, in the commercial fisheries. As one of our oldest industries we have been very slow to appreciate the size of this industry and its importance to our every-day life. Its output is invaluable in maintaining a balanced ration in the feeding of our people. The developments within the industry that have taken place during the past two or three years in the direction of putting a better commodity on the market, can be highly praised. The sanitary conditions under which fish are handled from the fishing grounds to the consumers' tables excel those of any other period in the history of the industry and are such as should command the confidence of the public. Both the consumers and the industry appreciate the inspection of fish as it is now carried on in our State. It not only is of benefit to the former, as bearing on the quality of the fish sold, but to the latter as bearing on the increased consumption of fish which is bound to take place as the public more fully understands the situation.

It was only a short time ago that the industry was in the throes of a period of depression. It is rapidly emerging into a more commanding position than ever before, due to the teamwork of the scientists, the financier, the wholesaler and the retailer, the skippers and the rank and file of the men who handle the gear.

If all of this splendid progress is recognized by the government with a substantial appropriation that this Division can continue to be of increasing assistance in forwarding this general development, we will see the rehabilitation of an industry, which, from the nature of it, will be a truly Massachusetts institution.

## INSPECTION OF FISH

This office has been endeavoring to encourage the fish producers and dealers throughout the State to place the quality of their goods on such a high plane that criticism would be impossible. That was the mark aimed at, and at the same time it was realized that absolute perfection could not be obtained, that the elements of human nature and business, delays and the incentive of some to hold on and sell where possibly fish should have been thrown away, and thus save a loss, were almost inherent. But the grip on the upward rounds of the ladder of good fish is steadily growing stronger and today it is only fair to assert that never before has the fish eating public of the Commonwealth been so well served with quality fish as now.

In this connection it is interesting to have the truth of the above statements brought out strongly by others than ourselves, and for that reason we may be pardoned if we quote from the annual resumé of fisheries operations at the Boston Fish Pier by Fred F. Dimick, Secretary of the Boston Fish Bureau, than whom probably no keener observer or higher authority on matters of this sort is to be found in Massachusetts. Mr. Dimick says:

"It is worthy of note that more interest is shown in placing fish of fine quality on the market. Steamers and vessels have in some instances landed handpicked haddock, that is haddock on which the pitch fork is not used in handling them. Some vessels have taken aboard boxes in which the fish are packed, and placed in the hold of the vessel. The inspection law on fish which has been in force a number of years has had an influence to improve the quality of the fish placed on the market."

Coming from such a high authority and unsolicited, certainly it must be taken at its face value.

There are indications on every hand of the efforts of individual concerns to make quality shine above price as their guiding star to increased trade, and it really can be said in this regard that the quality idea is steadily but quietly growing. The fish inspection work is still in its infancy. It has made a good start. It can do more and better work as it goes on with an added force of deputies which is considered necessary. In the annual order of appropriations for 1927 there was made provision for one new deputy. On July 15, 1927, Capt. Jerry E. Cook of Gloucester was given the provisional appointment, the idea being for Captain Cook to have headquarters at Gloucester and during seven months in the year to handle the large fresh fish fares designed for splitting and salting and which weigh anywhere from 100 to 225 thousand pounds each. To assure the quality of trips of this sort requires expert knowledge of the fisheries. Hence the appointment of Captain Cook.

The work of inspection at the Boston Fish Pier, at the Atlantic Avenue concerns in Boston and at the retail stores throughout the State, also the cold storages and freezers has been carried along in accord with the same schedule that has worked out well in former years, to the end that where it was found necessary places were visited at least three times annually and sometimes more frequently, while other places were inspected at least twice a year. It might be said here with all due force that the number of inspections in the markets of the State are limited by the appropriation set aside for the work of the office of the Inspector of Fish, and it might be well to suggest that the amount given should at least keep pace with the increases in salaries because it is sometimes embarrassing to have to hold men, who are eager to work, in the office because of the fear of exceeding the expense appropriation.

It is recognized on all sides that the fish business is gradually changing. It is known also that Massachusetts is the premier fishing state and that fish inspection has come to be a standard practice within the confines of the Commonwealth and on the fish sent out by her dealers. For two years leading fish dealers have represented that the Commonwealth could best



aid this oldest industry of the State by expanding the work of fish inspection. This they have unreservedly said at the State House. It is admitted that some changes could possibly be made in the present fish inspection law which would, while giving it no more power than necessary, fit into the present scheme of things a little more effectively. It has also been suggested by many of the fish dealers that the fish inspection work be expanded to include not only fresh and frozen fish and cold storage fish as at present, but salted and pickled and cured fish; in fact, to evolve a fish inspection act to the end that all fish landed or brought into Massachusetts ports from whatever source, and all fish shipped from Massachusetts ports to whatever destination, might in the final analysis bear the magic term "Massachusetts Inspected." Given this, then, the future of the Massachusetts fisheries and the Massachusetts fish industry could well be called secure.

The following table shows the work accomplished during the year 1927.

Inspections in retail stores,	3,157.
Inspections in wholesale stores,	16,334.
Freezer inspections,	317.
Inspection of pedlar's carts,	540.
Inspection at Yarmouth, N. S. steamer,	235.
Vessel inspections at Gloucester,	403.
Vessel inspections at outlying ports,	50.
General inspection trips,	8.
Fish condemned at Boston Fish Pier from vessels,	15,869 pounds.
Fish condemned at Gloucester direct from vessels,	15,000 pounds groundfish; 2,000 pounds swordfish.
Fish condemned at retail stores,	2,570 pounds.
Condemned at Fish Pier from consignments on Yarmouth, N. S. steamer;	graded as "jellied" 33 fish; 11,036 pounds.
Condemned, landed at Boston from Canada by rail and steamer,	1,176 pounds.
Condemned, landed at Boston Fish Pier arrived by rail,	6,035 pounds.
Condemned, landed at Boston Fish Pier graded as "jellied,"	59 fish; 14,869 pounds.
Total condemned at Boston Fish Pier, and at Boston from Canada by rail and steamer,	35,586 pounds.
Total inspections,	20,638.
Total fish condemned,	104,141 pounds.
Total court cases,	19.
Total convictions,	18.

### THE DEEP SEA FISHERIES

The off-shore fisheries as pursued by vessels from the ports of Massachusetts, and in which line this State is unexcelled both in size of fleet and total catch apparently in the western hemisphere, brought to market during the year 1927 a record catch. When it is recalled that the vessels hailing from Massachusetts towns and cities along the coast land their catches from Cape May to Portland, the scope of their activities is but mildly stated, for it must be understood that in order to market at these two extremes, they pursue their vocation from Cape Hatteras on the south to the straits of Belle Isle, contiguous to the Labrador coast on the north.

The greatest increase is noticeable in the landing of groundfish and in this respect it is to be noted that the Boston Fish Pier, the greatest fish landing place in all America, exceeded its previous high record.

One could go on, if space permitted, in regard to fisheries catches and landings, but sufficient to say here that the year cannot be put down otherwise than successful to fishers, buyers, and sellers. It really was a good fish year. The winter haddocking fleet, centering at Boston, pro-



duced a record catch, and strangely enough, when fish were most plentiful some very satisfactory prices were realized, which was due to the great increase in the demand for fish fillets, that is the sides of haddock and codfish daintily cut off in one delicious slice and sent to the consumer carefully iced and ready for the frying pan.

The operations of the fleet, following closely the lines of the previous year, found December a very hard month in which to fish owing to very bad weather and throughout the season was punctuated with flurries of weather, that were anything but fit for fishing. Owing to the early striking in of the schools of fish on Georges some large catches were made sooner than anticipated, with the result that the smokers, canners and splitters were able to secure an early supply and still the fresh fish market was supplied at good prices. The week ending March 17 made the record for all time, when 7,084,100 pounds were landed. Indeed in this connection it is doubtful if any four or five consecutive weeks around this date, as far as totals of fish landings are concerned, were ever equalled in the history of the fisheries, the total for 4 weeks being in the neighborhood of 24,631,383 pounds. Prices during the Lenten season were fair and indeed at the end were very good indeed.

With reference to the summer fresh fishing fleet, it can be said that more fish than usual were landed at the Boston market. The usual overplus went to Gloucester for splitting and canning, while many crafts with capacity fares went direct to the Gloucester market. The vessels that fish to bring home so-called "splitting trips" landed far less than the previous year. These crafts operated mainly on "Middle Ground," in the vicinity of Sable Island and on Western Bank. They found fish scarce in the early part of the season, but after July 15 they seemed to strike upon the school fish and from that time until fall the fares landed were of satisfactory quantity.

The fresh halibut fleet, composed of about the same number of vessels as last year, enjoyed a most successful season both as to catch and prices. The increase in catch was most gratifying, the total landings being 4,653,950 pounds, which showed a gratifying increase over 1925 and compares favorably with 1924 when 4,638,672 pounds were landed. Prices of halibut averaged higher this year than any year in the history of the industry and it is noticeable that a greater amount of the total catch was taken in the vicinity of Quero Bank, one of the most famous old-time fishing banks of record. A salient point in regard to the halibut fishery of this year is that several very large trips were taken from the shoal water of Green Bank and St. Pierre Bank and also on what is known as "The Funks," a definite ridge off the eastern side of Newfoundland. For the first time in many years also, several trips were caught in very, very shoal water, sometimes the trawls being set in seven or eight feet off the island of Anticosti in the Gulf of St. Lawrence.

The gill netting fleet had a year that would compare favorably with 1926 and in some spots, being favored with high prices, was one of satisfaction. The fleet, as far as Gloucester is concerned, comprised about 16 boats. Pollock during the fall formed the principal catch while later on during the winter, codfish, etc. were taken, followed by the usual catches of haddock in the spring. So satisfactory were the returns from this fishery that some of the boats engaged in it throughout the year. During the fall season when pollock were schooling, boats were landing from 15 to 30 thousand pounds for one night's fishing. Beside the gill netting crafts that operated from Gloucester quite a number of small boats fitted with gill netting gear fished out of Swampscott. The report from here is that the season was fairly successful as far as catch was concerned, but because of unusually low prices the fishermen took off their nets and engaged in lobstering earlier than usual.

The swordfishery conducted by over 100 crafts from Massachusetts ports, besides many from Maine and Connecticut fishing places, had a

successful year. It is true that the catch by the Massachusetts crafts did not reach the record of 1926 by some 1,671 fish, but when it is recalled that the fleet was hampered by unusually stormy weather and fog it is safe to say that with average fishing conditions the year would have been a record breaker. As it was, however, 12,323 fish were landed at Massachusetts ports as against 13,994 last year. Also in this connection it might be well to state that the importation of swordfish from Nova Scotia, via Yarmouth steamer, which is the usual method, was quite discouraging, in fact probably not one-half as many as the previous year. It is doubtful if 1500 fish reached the Boston market from Nova Scotia and this would certainly be not over 50% of the landings of last year.

The first trip of the season was landed at Boston on the sch. Hazel Jackson, 52 fish, on Thursday, June 16, the fish selling to the wholesale dealers at 40 cents per pound, the same price as the first trips of last year, but it should be noted that this fare was fully a week in advance of the arrival of the initial trips of 1925. Following along, in the latter part of June, the arrivals were so light that even the opening price was exceeded and small fares landed reached 45 cents per pound, the fish running a little larger in size than last year at this time. Swordfish continued in light supply throughout July, the operations of the fleet being handicapped by fog and bad weather, so that at the last of July the landings were fully 50% less than last year, although the fleet was larger, and strange to say after the opening of the season the fish ran smaller than usual. Coming along with the warm weather in early August, fares began to be larger, and the fish also showed a disposition to run up to the westward and in reasonable proximity to Nantucket, Marthas Vineyard, Cox's Ledge and Block Island and the small boats, manned by two men generally and sometimes three, fared well in consequence.

From then on, swordfish were in better supply and were found showing freely on Brown's Bank and around South Shoal Lightship, the fish from the South Shoal being larger than the eastern fish. The apparent deficit of 50% in the earlier part of the season was made up to a figure nearly approaching last year's total before the season closed. By early September the crafts began to haul out of the fishery as they arrived and the season closed soon after. Swordfish continue to be in the luxury class.

#### *Mackerel Fishery a Success*

Following the record-breaking year of 1926 in the mackerel fishery, naturally hopes were high that even this wonderful record might be exceeded, and indeed for a time it seemed that this was to be the fact; and truly it would have been so had it not been for the unexplained disappearance of the fish during the latter part of the summer and throughout the fall on the home fishing grounds.

The season out south was opened by the unusually early get-away of the fleet. The crafts however were met by very bad weather on the southern fishing grounds, causing the fleet to remain inactive for days at a time and some of the crafts were almost put out of operation by loss of seines and boats and other fishing apparatus. However, with the natural instinct of fishermen to overcome apparently insurmountable difficulties, all troubles were met and by the middle of April the fleet was found actively engaged.

Seldom has it been recorded that a more unfavorable state of weather existed in southern waters for the taking of mackerel than this present spring, and yet the boats and the vessels, large and small, hung to it, deep bedded with the belief that the fish would surely come. And come they did and in almost unequalled volume, for beginning with April 19 when substantial trips were landed at Cape May by Gloucester vessels, there was scarcely a let-up in the taking of mackerel throughout the season.

As a matter of record it might be set down here that the first schools were taken 30 miles southeast of Chincoteague Island and that the fish



mostly weighed about  $1\frac{1}{2}$  pounds apiece. The first trips landed at Cape May were rushed by express freight to Fulton Market, New York City, where they sold for 30 to 33 cents per pound.

From thence on, the bad weather having apparently departed, the mackerel catchers met with such success that the New York market was fairly flooded and prices went to a level lower possibly than ever was known before. Nevertheless, the continual flood of trips made the season a very, very successful one. It might be noted in passing here that up to April 28, the southern catch of fresh mackerel had reached 24,265 barrels. From then on the catch jumped by leaps and bounds. Apparently, there was no limit to the number of fish and the great number of schools and the ability of the captains and the vessels to make their hauls. So much so was this true that while the fish were coming to the northward, up towards Barnegat and Fire Island, catches were really phenomenal. The mackerel schools then moved rapidly to the eastward and by the time usually set for vessels to go to the Cape Shore off Nova Scotia, there to pursue their usual late spring operations, it was found that so great was the body of fish so near to the home market that but three vessels went to the Cape Shore, a most unusual situation.

The catches of the fleet continued very large, many hauls being made off No Man's Land and Block Island, and Boston became the receiving point quite a while before the usual Cape Shore fares were looked for. It would be almost useless to try to trace the operations of the fleet from now on, but sufficient to say that but three trips of fresh mackerel were received from the Cape Shore, while the whole fleet was paying its attention to the larger schools nearer at home and also to note that up to date of June 10, the usual time of the arrival of the bulk of the Cape Shore fleet, the southern mackerel catch had amounted to 97,997 barrels, 40,000 barrels in excess of the previous year and without doubt the greatest southern mackerel catch on record.

From then on the fleet operated with success on the schools around Block Island and No Man's Land, South Shoal Lightship, South Channel and even on Georges. Following this there were good catches made in Boston Bay, on Middle Bank and some few catches in the vicinity of Portland Lightship. A feature of the mackerel fishery for the year was the appearance in large numbers of bulls-eye mackerel which showed up in large quantities off Block Island and the Vineyard Sound vicinity. These fish came in such numbers as to actually glut the market and shipments failed to pay for the cost of packing and transportation.

The season held out its promise of being a record-breaker for all time up to August 1st, when a sudden decline caused by foggy and rough weather put the "stopper" on the onward rush. From then however the catches held ahead of 1926 for the rest of the month, but when September came in the catch fell off and the 1926 record became again predominant.

While the total catch of mackerel did not equal that of 1926, which is now by common accord admitted to be the record, still the difference was not over large and the prices so much more generally sustained this year that it is safe to say the mackerel fishery of 1927 as far forth as financial returns are concerned, at least, equalled the record catch year of 1926.

While the mackerel seiners had one of their most successful seasons as noted above, the netting fleet as a whole did not share in the prosperity, for the reason that while their catches out south in the spring were large the prices were very low indeed and hardly paid for the loss of nets and the wear and tear upon the gear. During the present fall, however there was a little gleam of sunshine because the netters that fished out of Gloucester and extended their nets 30 and 40 miles off the coast, met with a fair amount of success and their catches not only found a ready market, but a splendid price therefor. At the time of this writing, November 30, the catches were continuing almost nightly. There was every indication that the fleet, if favored by ordinary weather, would continue its opera-



tions at least until Christmas. Some idea of the splendid success attending on this fall fishery can be gleaned from the notation that in one night's fishing the sch. John Cooney landed in Gloucester 12,500 pounds of mackerel taken within fifteen miles of Eastern Point whistling buoy.

The Massachusetts catches of fresh and salted mackerel from December 1, 1926 to November 30, 1927, inclusive, and for the corresponding period of the three previous years, were as follows:

	Dec. 1, 1926 to Nov. 30, 1927	Dec. 1, 1925 to Nov. 30, 1926	Dec. 1, 1924 to Nov. 30, 1925	Dec. 1, 1923 to Nov. 30, 1924
Salt Mackerel (Bbls.)	1,002	5,380	12,442	11,000
Fresh Mackerel (Bbls.)	252,962	304,385	203,961	101,954
Total	253,964	309,765	216,403	112,954

*Cape Shore Catches of Mackerel for Seven Years*

Year	Arrivals	Fresh Mackerel (Pounds)	Salt Mackerel (Barrels)
1927	3	155,000	3
1926	53	2,397,700	1,310
1925	34	1,545,000	1,075
1924	24	996,000	854
1923	31	1,240,680	211
1922	48	1,353,900	2,344
1921	29	2,160,000	3,003

*Hope For Return of the Bluefish*

One of the most heartening features of the whole fish year along the Massachusetts coast was the appearance and taking, in increased numbers, of bluefish of good size. This, coming at a time following a long period of years of practically non-appearance of these gamey and delectable fish, has given rise to the hope in the hearts of the fishermen, the sportsmen and the epicure that once more they may be found in goodly quantity along our shores.

During 1923-4-5-6 keen observers found that every little inlet or river running into Vineyard Sound abounded with small bluefish running about four to the pound. These fish would strike in about the first of August and stay until the first of October, giving much sport to the rod and reel fishermen.

During the summer and fall of 1927, that is, this present year, there were no small fish to amount to much except around Westport and Padanaram river which had about the same run as the four previous seasons. Then during August, quite a few medium and large bluefish were caught at Dead Neck beach at Osterville and around Succonessett Rips. These fish went about four pounds each, and once in a while some fortunate fisherman could catch one going as high as seven or eight pounds. The news of the appearance of these fish soon spread and the fishing was in a measure quite intense, some of the boat fishermen following the fish along the south side of Cape Cod as far east as Monomoy Rips, making fairly good catches every day that it was suitable to fish.

On the north side of the Cape also comes an encouraging report to the effect that off the so-called Dennis beach, which is about half way between Cape Cod canal and Provincetown, during the last week in September and the first week in October, there was a catch of almost 100 barrels along the above-named stretch. These fish were mixed in size, but regardless of that, each fish was fat, thick and solid-meated which showed that it had been on good feeding grounds all summer.

One thing also is very noticeable; when the fish were first taken off Succonessett about all showed signs of feeding on small porgies and sand eels, but the fish taken on the north side of the Cape were filled with "silver-sides," spurling and several had quite a few blackback flounders in their pokes.

Warren E. Burgess at Brewster reported, along with catch of other fish in his trap, the take of 15,666 pounds of bluefish and 3,386 pounds of striped bass; certainly a most encouraging and interesting report, for not in recent years has any such satisfying return been made by any trap on bluefish and striped bass. Cape fishermen, besides being much interested in this report, see in it much hope for the return of the bluefish and striped bass in something approaching the quantities of former years. Mr. Burgess himself says he has known nothing like this for fifteen years. He is very much interested in the bluefish problem and states in a letter to this office that the fish began to run about July 1st and weighed about  $\frac{3}{4}$  of a pound each, and as they grow faster than any fish that he knows of, by the end of the season (about October 30) those taken weighed  $2\frac{1}{2}$  pounds each. He states that each year he had hoped that the "blues" would come back in July weighing fully as much as when they departed in October, but that this has not been the case, for they seem to begin all over again and weigh about  $\frac{3}{4}$  to a pound on arrival. He invites a solution of this marine riddle as to where do the bluefish go when they reach larger size, and why do not the larger fish return to these waters? This Division is equally interested with Mr. Burgess and would like to hear from anybody as to his opinion on the subject. Mr. Burgess also states he has noticed that in the small fish in July and August there are spawn, both yellow as well as white. The striped bass taken in his traps ran in all sizes from 3 to 20 pounds each and this species really does seem to be increasing from year to year, which certainly is good news.

In conversing with the fishermen of the Cape one gets the impression that from these splendid signs and catches they are looking forward confidently for a return of the bluefish. Naturally everybody will wish that their hope may be fulfilled.

### *Cape Cod Activities*

Taken as a whole the fisheries of Cape Cod in 1927 can be at best considered no more than "fair." In some cases good prices made up for small catches, and while some sections would not range as high in value of catch and landings as others, still on the whole the term "fair" would seem to apply. For instance, ten men at Provincetown fishing a string of ten traps, shared about \$1100 for the season and certainly this is a fair amount, although admittedly not anywhere near a prosperous season. The weather after the traps were put down was good for trapping and thus but a very small amount of twine was lost because of storms. There was an exceptionally large run of herring in March and April, the trap catch at Provincetown alone being estimated in the vicinity of nearly 20,000 barrels. The whiting catch which came later in June and July and after, was not as large as hoped for, and in consequence it may be that the demand will exceed the supply before the winter is over. The catch of squid was below normal. It is noticeable that in spite of the large mackerel run just outside of Provincetown, in Boston Bay so-called and on Middle Bank, the traps took only a few barrels during the whole season, and this applies to the whole of Barnstable Bay. Indeed, no school mackerel were taken in the Bay throughout the season.

The spring netters did poorly and the lobster catch, as far as can be learned, was less than last season, but this was financially compensated for by better prices. What would apply to the traps at Provincetown can be said also of those at Truro, while those at Brewster and Barnstable are reported as not faring as well. At Provincetown the flounder



boats did well throughout the summer, but about all of them went direct to the Boston fish pier in order to save shipping expenses and thus made money.

The sea scallop fleet was small as most of the fleet, some of which were from Portland, Me., went to the southward and fished on the grounds off Cox's Ledge and landed their fares at New Bedford. It was a big year on herring for the traps at Provincetown, fair on squid, poor on mackerel, and very few horse mackerel were taken. A few small sized bluefish found their way in the traps in the spring, but there were no scup or sea bass taken. The mackerel netters at Provincetown did well in the spring fishing.

The preparation and shipping of frozen whiting as an article of food, which was mentioned briefly in last year's report, has turned out to be a remarkable success as far as can be learned. The whiting are frozen and then skinned and cleaned until there is nothing but the flesh of the fish left. They are then carefully culled into three sizes, inspected for any possible defects, and after this work is done they are carefully frozen and packed in cartons or in boxes in weights to suit the trade. This industry is carried on by the Atlantic Coast Fisheries Co. of New York, one of the largest fisheries concerns on the Atlantic coast, which has recently bought both the Cape Cod and Colonial freezers at Provincetown, and established whiting headquarters in the Colonial freezer, where on the fifth floor, a crew of some 30 to 40 men and women are actively engaged in this work of preparing the whiting for market. When it is said that the marketing of this delicate and tasty fish will be limited this winter only by the supply, it can be readily realized that a new branch of the fish business has come to the front and the product has been accepted heartily by the fish-eating public. As this was a poor season for whiting and the catch was below normal the Atlantic coast people were forced to buy whiting from other areas to supply the demands of their trade. This will show to what heights the demand for an appetizing and well-prepared fish will go.

During the latter part of the season some of the traps secured small hauls of "bulls-eye" mackerel or "hard heads" as they are known to many. As these fish were also taken in large quantities in traps to the southward there was little demand for them in New York, and consequently the price was low. The few of these mackerel taken in Boston Bay during the heavy glut were brought in here and salted. The flounder fleet which did well during the summer, did poorly at Hyannis during the previous fall, but returning to Provincetown had a good winter, and those that returned to Hyannis in the spring also did well. A fleet of about 20 crafts took up the fishing again at Hyannis this fall, about October 20, but met with indefinite success, the catches being not over large, while the fish taken ranged small, going in the vicinity of 150 fish to a barrel. This fleet returned to Provincetown before December 1st and took up operations again off on the usual ground in that vicinity.

The catch of whiting as compared with last year was about one-half, while the demand was very great. Squid taken in the traps amounted to but one-half the last year's catch, while the mackerel take was but one-third of 1926. As previously stated, the herring catch was the largest for many years. While the catch of the traps as a whole as compared with last year was somewhat less, still it could not be called a poor year. The freezers at Cape Cod, taken as a whole, had, as compared with last year, less stock on hand this fall excepting herring, of which the supply was good.

At Chatham, which can be considered as giving the fish report for the season on that side of the Cape, herring were very plentiful but prices were low. Squid were very scarce, ranging from 6 to 25 cents per pound and the catch about one-tenth of last year. Large mackerel were more plentiful than last year, but prices were lower, ranging from 3 to 20



cents. Butterfish ran large and there was a fair catch in some of the traps, but on a whole these fish were not as plentiful as other recent years, prices ranging from 16 to 28 cents and most of the season from 20 to 25 cents. Small bluefish showed a gratifying increase. These fish were more plentiful than for several years. Lobsters were not very plentiful. Scallops were taken in greater quantities than last year and the prices were much higher, the lowest price paid being \$2.50 per gallon and the highest \$5.50.

#### *Nantucket Fisheries*

The flounder fishery, which is the staple fishery of the Island, has not been as good this year as last; also the fleet engaged has not measured up to the figures of last year for the reason that quite a number of the large boats, whose skippers, finding prices for flounders at New York not to their liking, shifted over and went quahauging and some to scalloping. That both of these ventures must have proved financially satisfactory is evidenced by the fact that while now November is considered a good month for flounder marketing, many of these boats are still sticking to the quahaug and scallop game.

There was a very short season on flukes this summer and the fish were not plenty at any time. The lobster fishery was not as good as last year, although some boats did well for a short time, the reason for the decline being not so much the lack of crustaceans in the water as it was that there was a lot of rain and bad, blowy weather all through the summer. On the whole the season might be called about "fair." The quahaug fishery has been somewhat better than last year and more boats have been engaged. The price, however, may not have averaged up to the previous year, but yet the financial returns, taken as a whole, could not be called unsatisfactory. There were plenty of codfish this fall and the traps did better than for several years in the taking of these species. The cod handliners also did well. The mackerel catch in this vicinity was not heavy. A few fish kept showing up all through the season with the traps getting their full proportion, but no big hauls were noted.

The scallop season showed splendid fishing, the first month with high prices and high grade goods, but at the present writing there is an ominous diminution in the catch which bodes no good for the scallop situation in the waters of the Island. This is proven by the fact that some of the boats have already given up the fishery for the year. There was a good run of alewives this spring, but the price was very small and only enough were caught for local use and for lobster bait. Very few pollock were taken by the boats in these waters this spring.

One of the principal reasons for the falling off in the flounder fishery as regards the port of Nantucket is of course the fact that many of the larger boats have fallen into the habit, when they have a good catch, of going through direct to the New York market and there landing their fares, where a few years ago a great many of these catches were landed at Nantucket and shipped barreled, to the New York market. Some of the captains claim, notwithstanding the extra time consumed in running to Fulton dock and returning to the fishing grounds, that, considering the expenses of freight from Nantucket and the cost of barreling, etc., they are better off to go through direct with their fares. This naturally is a question which concerns only the fishermen themselves, and it would seem that there is, to say the least, a difference of opinion on the matter, more especially where the question of time occupied in going through to New York, and which might be well used on the fishing ground is concerned.

#### *Buzzards Bay Fisheries*

From all facts that can be gathered by this office it is safe to say that the fishing season in Buzzards Bay has been better than last year. Traps of the Biological Laboratory fared better and in the other traps which

are allowed by law in this region, fish of all kinds, except mackerel, have been more abundant than for a good many years. There are rumors that more fish traps will be set in the bay near the vicinity of Cuttyhunk. However, this latter statement is not exactly endorsed at the present time.

The marine fishery as a whole in Buzzards Bay, outside of the few traps allowed by law, is confined to handline fishing and lobster fishing, there being no seining allowed in this district. Conditions according to our deputy here, are normal as regards handline fishing, the fish taken being confined to tinker mackerel, tautog, scup, etc., and is mostly carried on for sport and with little commercial aspect.

Speaking of the district including Fall River, Westport, Somerset and Swansea, the marine fisheries here are very limited, in fact being confined to the town of Westport. About all the fish landed at Fall River came from the neighboring waters of Edgartown, and Seaconnet Point, the latter in the state of Rhode Island. The shore fisheries in this district amount to but little as most of the areas have been condemned owing to pollution. With regard to Westport in particular, which is practically the center of fisheries activities for the extreme western corner of Buzzards Bay and in touch with the Elizabeth Islands, it can be said that lobsters have been more plentiful this year than for the past ten years; but also however, more fishermen have been engaged.

Codfish have been much more plentiful in this section than ever before in recent years, and an encouraging feature of note is, that bluefish have shown a good increase over last year. Smelt have been caught in the Westport River and at South Dartmouth in fairly large quantities and the fish have been larger than at any previous recent season; in fact at Westport this is the first year for some time that any have been taken on hook and line. Salt water perch have also been very plentiful and the squeeteague have appeared in fair quantity, which is something that has not occurred along this coast for at least ten years. Striped bass were really plentiful. Quite a few of these fish were taken in the fish traps along the shore, as well as many by rod and reel and the fish ranged anywhere from five to thirty pounds, which certainly is a splendid showing. It is worthy of notice here, however, that the catch of tautog fell off in this locality and also that a much smaller catch of this delectable fish is reported all along the coast in this section, the total landings being much less than for quite a few years.

Despite the fact that Buzzards Bay at the present time is producing very little fish, speaking commercially, it is interesting to note that situated at points on this beautiful body of water are two of the important fishing ports of Massachusetts, New Bedford and Woods Hole. To these ports ply daily busy crafts that pursue their fishing operations off Block Island and Cox's Ledge, Marthas Vineyard, Nantucket and even "The Rips" and Georges, so that any story of the fisheries of the Commonwealth without mention of what is going on at these ports would be lacking in completeness.

At Woods Hole the landings of swordfish were a little better than the previous year, in fact 900 of these big fish really were landed and it is noticeable that it was only necessary to condemn only one fish as a "jelly." As a whole, in the opinion of the dealers there, the fishing on the grounds on which the vessels supplying this port operate was about the same as last year with the exception of the noticeable increase in the bluefish take. There were times in the season when the small boats did not operate, owing to the glutted market condition at Boston and New York which precluded their receiving prices which would have allowed them to even pay their expenses. Bulls-eye mackerel were in marked receipt, and although there were several times when it did not pay to ship them, yet on the average however, the prices were a little better than last year. Handlining for scup and bass was profitable and the catches showed an increase over last year. There was about the same amount of landings of



mackerel and flounders as the previous season, but haddock and squeteague were very scarce in this vicinity. More bluefish, however, were caught in the waters noted above than has been taken since the days when the bluefish practically deserted Buzzards Bay. Not as many butterfish were brought to port as the previous season and practically no menhaden were taken in these waters.

At New Bedford 1437 swordfish were landed by the boats as against 800 the previous year, which is indeed a very gratifying showing and indicates that during the warmest part of the summer season quite a body of these fish were well up to the westward. Naturally this was very encouraging to the shore fishermen, as they received splendid prices,—prices probably never before equalled on an average. Ten fish were found to be jellied and were condemned. The New Bedford opinion as to the fishery in Buzzards Bay is, that it was even worse than last year, both for traps and handline, while the scallop situation was such as to be devoid of any encouragement at all, the New Bedford dealers being obliged to buy a lot of their fish from Boston and other ports to supply their demand.

#### *Marthas Vineyard*

Taken as a whole the Marthas Vineyard fisheries for the year can be recorded as successful. There was a fair run of codfish all winter, the fish running largely to "steakers," so that the trawlers fared very well. After the spring fish struck, however, the handliners had only a fair season as the fish were small and market prices low. Pollock struck fully a month earlier than common on the fishing grounds in this vicinity. They usually show up in May, but this year they came on in April and stayed and "bit" well for fully three weeks. The price locally varies from  $1\frac{1}{2}$  to 3 cents per pound, but as the fish ran large and "bit" so freely the fishermen did very well on them. The traps in the Sound caught but few scup, although the sea bass were more plentiful than for several years. The Bay traps did very well on scup, taking several large hauls. The handliners also had a very good year on scup, some of the two-man boats stocking well over \$2,000 for four months fishing, which is considered good, as their expenses are naturally small. Mackerel, both net and seine, were scarce, the netters getting only about a week's fishing, while the seiners did practically nothing. The price was low, due no doubt to the exceptionally large catches being landed to the westward.

The inshore fleet of swordfishermen fared hard the early part of the season due to the prevalence of rainy, easterly weather that prevailed up to the middle of August. The weather, however, allowed the fish to work in towards the shore and to "bunch up" and the fishermen did very well from then on, so well that the season would rank possibly somewhat above the average.

The lobstermen were also hampered by the bad weather and especially by the very heavy swell and gale of August 24 which practically destroyed the gear of all hands. After they got fishing again, however, they found lobsters more plentiful than before, these increased catches being met by very high prices, 50 cents per pound wholesale, so that the season commercially will rate as the best for the past three or four years. It should be noted here as part of what a fisherman has to meet in his daily work, that a fleet of 18 destroyers of the United States Navy used Menemsha Bight for a harbor for a long time, steaming off-shore every morning and coming back again at night. They showed little or no regard for the gear set by the fishermen and in consequence the loss to the fishermen caused by their activities was great. It is understood that the fishermen of the Island are making efforts to have their anchorage changed in the future. The catch of summer flukes was about the same as during the past few years, the small draggers doing fairly well, but for a short period only.

Sea scalloping has been carried on in this vicinity very extensively



during the past season. This is practically a new industry for these parts, although sea scallops have been occasionally fished for with more or less success in outside waters. This year sea scallops were found very plentiful south of No Man's Land in about 26 fathoms of water. About 50 crafts of all sorts, from cat boats to 80-foot schooners, were engaged in this fishery, carrying from two or eight men and landing from 200 to 1200 gallons at an average price of \$2 per gallon on a trip lasting usually two days and one night. Some of the larger crafts engaging in this fishery had stocked up to \$18,000 this Fall, and they are still at it and doing well whenever the weather permits them to fish, with the price in November around \$4 per gallon.

The Bay traps have had an unusual run of butterfish this fall and the traps are still fishing. Flounders are now running and the small draggers are landing about five barrels daily, clearing about \$10 a barrel laid down in New York. Codfish have been very plentiful around No Man's Land this fall and boats have made good catches with prices ranging around \$4 per hundred weight at the Woods Hole market. Mackerel have not shown up around here this fall, neither have there been any schools of menhaden seen during the summer, although there has been a marked increase in the number and size of bluefish taken. So encouraging is this increase in the catch of bluefish that it almost seems safe, in the minds of the fishermen, to predict that the bluefish are gradually coming back.

With reference to the fisheries of the Vineyard, there are some features which may be summed up in a single paragraph which will be found of peculiar interest. For instance, no yellow tails were landed this year. Two or three Spanish mackerel, which are certainly out of their latitude in these waters, were taken here, as were also two or three king fish. It is also recorded that a tarpon, whose habitat is in the warm waters of the Florida coast, was caught in a trap at Menemsha Bight, while two or three salmon were also taken at the same place. No horse mackerel were reported taken, while the traps were over-loaded with whiting. While there was a large catch of pollock this year, but it was noticeable that there was only an average season on haddock with some showing in the spring. As noted above, the codfish season was very good, the fish running bigger than usual and very plentiful, although not so close inshore. Mackerel of course were very abundant throughout the season. No hali-but were taken. Flounders were scarce in the summer, while the winter fishing was as good as last year. For alewives an average season can be reported, while the catch of tautog would be considered only an average, but these fish were not fished for as hard as in previous years.

Among the outstanding features are the facts that more sea bass were taken than last year, also more scup; in fact, this was a big season on scup, while no recent year has ever equalled the present on the catch of butterfish which are and have been running quite late. It was an average season on swordfish and the small boats got more fish inshore than last year. The eel catch can be considered as average, and with good weather last year's landings would certainly have been exceeded. More bonita were taken than for several years and they ran of larger size than common. A few more of the high lights of the Vineyard fishing season can be briefly summarized as follows:—More weakfish than from 10 to 20 years. Bluefish catch showed a big increase and in the opinion of the fishermen the landings were the most for 35 years at least. A few sturgeon also were taken by the swordfish boats, but there is no record of any boats engaging in this fishery with nets. Striped bass, a splendid fish viewed from not only eating, but sporting angles, showed up in unusual quantities, and more than common were taken.

#### *Boston Fishing Activities*

It is simply wonderful to note that for six consecutive years the receipts of fresh fish at the Boston Fish Pier have toppled over each other

in the evident desire to maintain the claim of the city as the premier fresh fishing port of the new world. And not only this, but to put at present and for all time the name of Boston as synonymous with Grimsby and Hull of England as the really largest sources of fish supply in the world.

The evident desire on the part of the captains and the fishermen themselves, as well as the dealers, that fish to be shipped to the consumer via the retail route must be quality fish, is pleasing and is to be commended. In other words, good fish is the rule and poor fish the exception. The various seasons wherein different species of fish are handled at the Fish Pier has brought about a very successful year for all engaged, fishermen, dealers and shippers. It is possible that the margin of profit has been small, but the fact remains that Massachusetts fish, from the Boston Fish Pier, are today being laid down in fit food order on the Pacific coast.

In this connection this report would be incomplete without the authoritative statements of Fred F. Dimick, Secretary of the Boston Fish Bureau. This office is pleased to receive Mr. Dimick's resumé for the year and considers it of such value as to print entire. Mr. Dimick says:

"Groundfish have been in good supply from the fishing fleet, and dealers have had a good trade. There is some complaint, however, of the small profits in the business. The business in haddock filets has continued to expand, and large quantities of haddocks are used in that branch of the business. Many of the dealers are now equipped for handling the fillet business. Advertising, and modern methods of merchandizing, are being used more and more.

"The receipts of fish at Boston Fish Pier direct from the fishing fleet for the sixth consecutive year make a new record.

"The catch of haddock in South Channel, and off South Shoal Lightship has been large, but the catch of codfish and haddock on Georges and Western Banks has been light.

"Although the catch of mackerel was not so large as last year a large amount of these fish has been distributed. The spring catch was very large and comprised fish weighing mostly  $1\frac{1}{2}$  pounds each. Considerable less mackerel were frozen than in the previous year and scarcely any were taken on the New England coast east of Cape Ann.

"More bulls-eye mackerel were taken, and seen this year, than for many years. The bulls-eye mackerel weighed about half a pound each but were in very light demand.

"The swordfish fleet early in the season experienced much unfavorable weather, and the catch of the fish was not so large as in the previous year. Prices averaged 2 cents per pound higher than in the previous year.

"The handline codfishermen were not very successful during the past season owing to the scarcity of codfish on Georges Bank.

"The fleet of vessels engaged in flounder dragging that use small otter trawls has greatly increased as has the receipts of flounders. These vessels also land considerable haddock. During periods of favorable weather the market is often over supplied with these fish and they sell at low prices. But these fish are getting scarcer on the fishing grounds where these vessels operate.

"The catch of fish on Cape Cod has been light. The catch of whiting was considerably less than last year. There was a fair catch of herring. Very few mackerel were taken in the traps. More bluefish were taken this year than last year, and the catch of these fish appears to be increasing each year. They weigh from 1 to  $1\frac{1}{2}$  pounds each.

"Canadian fish have been in light supply. The Cape Breton catch of swordfish was light and receipts of these fish declined. The Nova Scotia receipts of swordfish amounted to 1,222 fish, compared with 3,226 the previous year. When prices of mackerel were high in our markets during



the month of November, and our fleet were catching but few mackerel, shipments of mackerel were received from Nova Scotia.

"The catch of halibut by vessels engaged in this branch of fishing was larger than last year, and a number of these vessels have in some instances landed "handpicked haddock," that is haddock on which the pitchfork is not used in handling them. Some vessels have taken aboard boxes in which the fish are packed, and placed in the hold of the vessel. The Inspection Law on fish which has been in force a number of years has had an influence to improve the quality of the fish placed on the market."

**Receipts of Fish at Boston, Direct from the Fishing Fleet, from  
December 1, 1926 to November 30, 1927.**

	Pounds
Large Codfish . . . . .	29,894,368
Market Codfish . . . . .	10,738,328
Cod Scrod . . . . .	113,885
Haddock . . . . .	97,014,734
Haddock (scrod) . . . . .	14,608,529
Large Hake . . . . .	3,485,099
Small Hake . . . . .	8,835
Pollock . . . . .	3,419,300
Cusk . . . . .	2,288,056
Halibut . . . . .	4,112,746
Mackerel . . . . .	20,091,120
Swordfish . . . . .	2,141,082
Miscellaneous . . . . .	9,114,389
Total . . . . .	197,030,471

*The Gloucester Fisheries*

While the landings of fish at Gloucester for the year ending November 30, 1927 show a marked falling off from the previous year of some eight million pounds, yet the fact remains that the fisheries year, taking into account the fishermen, the vessels and producers and the shippers has been one with little cause for complaint. True it is that in the early part of the year the export trade on dried fish was reduced to a minimum, and this in part accounts for the great decrease in the landings of the fleet which from May to September operates on the fishing banks to the eastward, commonly around Middle Ground and Western Bank.

In sizing up the conditions at Gloucester it is well to take note of the fact of the changing conditions in the fisheries. Where twenty years ago 50 sail of vessels sailed to the Grand Bank and contiguous grounds and brought home two trips of salted codfish each year, at the present season but one craft went; this one the famous sch. *Columbia*, possibly the finest and fastest vessel ever "cut out of wood." In the terrible gale of August 24, she probably met her doom with all on board, some twenty hardy fishermen, near the unyielding sands of Sable Island where the tremendous breakers rolled her without a trace of human sympathy. This leaves the port of Gloucester without a single craft to engage in what is commonly known as "salt fishing."

Because of the unsettled and almost disintegrated southern markets for cured fish in the spring the desire for splitting fish was very small and this in part explains the great reduction in the amounts landed of fresh codfish. However, the Gloucester fish business is advancing rapidly in the line of canned fish of first quality and several firms engaged in producing these goods have found the need of even more haddock than were landed last year.

As was stated above, the port sends out no vessels to bring home salted codfish, and yet so great is the demand of the curers and shippers that one concern alone this fall brought to its wharves in one steamer over



three million pounds of salted codfish produced in the waters of the Faroe Islands. It is evident that these concerns owning vessels and also being shippers of the best quality of goods at all times must find it cheaper to thus produce the salted product in the whole fish condition from other sources than their own expensive vessels.

Taken as a whole in all branches of the fisheries the Gloucester vessels fared well and no complaint is heard of poor trips or hard times.

The following table gives the landing of fish at this port from December 1, 1926 to November 30, 1927.

	Pounds
Fresh Cod	19,085,679
Salt Cod	2,348,886
Halibut	57,453
Halibut Flitches	9,067
Haddock	11,878,217
Salt Haddock	82,916
Hake	771,412
Salt Hake	418,003
Cusk	384,936
Salt Cusk	108,365
Pollock	3,184,314
Salt Pollock	172,094
Not Product of American Fisheries	5,305,011
Fresh Mackerel	7,174,988
Salt Mackerel (Domestic)	544,200
Salt Mackerel (Foreign)	134,800
Fresh Herring	1,053,957
Pickled Herring	40,800
Salt Bulk Herring	679,952
Scotch Cured Herring	40,000
Cured Fish	1,650,077
Miscellaneous	1,369,719
Total	56,494,846

#### SHORE FISHERIES

Outside of the enforcement of the Fish Inspection Act, so-called, the authority and activities of this Division, as far as marine fisheries are concerned, are confined to the coastal waters within the three mile limit. Therefore it is designed to make a report here of the fisheries doings along our shores. For the purpose of convenience, let us start with the northeastern corner of our state and work down gradually, winding up at Westport and the Islands.

The Salisbury, Newburyport, Newbury and Rowley fisheries have not been very prosperous this year and some branches really seem to be on the decline. For the past few years a small fleet of flounder draggers has comprised the nucleus of the fishing force. For four years there has been a noticeable decline in this fishery until at the present time it is almost a complete failure, so much so that but ten or fifteen flounders have been the result of many a drag on grounds that a few years ago yielded hundreds of pounds to a drag. A small number of gasoline dories and rowing dories have been very active and with some success working with trawl and handline. These crafts found small cod and haddock fairly abundant throughout most of the fishing season close inshore; indeed many amateur fishermen made good hauls of cod while fishing from boats and off the jetties at the mouth of the Merrimack River.

During the latter part of November there was an abundance of squid along the shores and in natural consequence large cod were being taken close in upon the beaches and near to the jetties, both trawl and handline, by the commercial fishermen of Salisbury and Newburyport. These fish-

ermen claim that this same school of fish has been on the various outer ledges of the Bay since the latter part of the summer, but because of so much thick, rainy and windy weather prevailing at the time indicated, the fishermen could not, by reason of inability to find their range marks, prosecute their fishing then on these spots. Mackerel were unusually abundant during July and part of August, but few were taken by net and seine locally, though many were taken by hook and line off Newburyport and Ipswich bars and in Plum Island sound. It is interesting to note that while the shore fishermen in some other districts reported dogfish and sharks in plentitude, yet very few were found in this locality.

Quite a few bluebacks were seined in and just outside of the Merrimack river mouth and sold for lobster bait in New Hampshire and Maine. Menhaden schools failed to put in appearance. A few striped bass weighing from five to ten pounds were taken on the hook and line off Salisbury beach early in September, and at about the same time quite a few medium sized pollock were taken in the Bay and off the mouth of the Merrimack river by trolling.

Whiting, or silver hake, were very numerous off the beaches during the greater part of the summer season. There has been no large herring found in these waters this year, although last Spring a few were taken in nets off Salisbury beach. A few small herring were being torched in Plum Island sound and in Ipswich and Rowley rivers during late October and November. Eel fishing in season was good and very remunerative. Never before in the memory of the oldest smelt fishermen were so few smelt taken in Parker, Mill and Rowley rivers as was the case last winter. There was a good run of smelt last spring in all the spawning streams hereabouts, and a heavy deposit of spawn was left therein, much of which died. Those few smelt fishermen who have been wont to fish here for market all winter were last winter forced to take up smelt fishing in Great Bay, N. H., where, strange to say, smelt were unusually abundant. As the result of this, the state of New Hampshire has now prohibited non-residents from taking smelt in Great Bay for any purpose. Smelt have been fairly numerous in Plum Island Sound and basin this fall. These being small, very few were taken, and until the ice comes and they start working up into the tidal streams it is fair to assume that the catch will be light.

Clams are now becoming more scarce than for years and years on account of the intensive digging resulting from large areas being closed by law because of pollution. The automobile plays no small part in this story of the scarcity of the clams, as it brings many transient clam diggers to the very limited areas of good flats that are now available, and likewise brings many additional customers to buy these clams who never knew what clams were before. The resulting prices are the highest known, and though the flats of Newburyport, Newbury and Rowley are pretty well depleted, these high prices are said to have made this year's work worth more to the diggers than in recent years. Unless the regular clam diggers can agree to adopt some safe and sane program for conserving the clams at once, their livelihood will be in a very precarious position. Over-digging and the taking of undersized and very large clams are doing much to hasten this condition.

Speaking of the Gloucester to Salem district, the outstanding feature of the year is the fact that during the entire spring and summer, at which time the shore fishermen expect to do their best, there was a succession of storms and even while clear weather prevailed the winds were exceptionally heavy from the eastward and northward with the result of kicking up heavy seas, which greatly handicapped the fishermen in their labors. The loss of gear caused by such a condition amounted to quite a considerable amount, and the loss of time also was discouraging to the fishermen. The fall herring fishery of Ipswich Bay and the adjoining rivers practically amounted to nothing at all this year and hardly any



fish were taken. There seemed to have been a plentiful supply of these fish in the bay and rivers, but the condition of the market was such as to not warrant the taking of them as there was not a dollar to be made. This market condition was probably caused by the great run of herring at Provincetown and also the mackerel and other fish that were held in storage. The alewife run at Essex was one of the best for many years, but most of the fish were allowed to go into the lake to spawn. But 170 barrels were taken for market and the lessee of the fishery had so much difficulty in disposing of them at a profitable figure that he declined to bother to take any more. At Ipswich the alewife run seems to be steadily increasing from year to year and gives promise in a few years of reaching the proportion of former days.

The small boat handliners and trawlers that fished off shore still continue to carry on and manage to do very well at times. On the various grounds off Cape Ann and in Boston bay, market cod, haddock and hake are taken by this class of fishermen and are supplied to the near-by markets. The gill netters still operate but are constantly reaching out for new grounds on which to fish. This fleet which now numbers about 15 sail, is apparently paying its way, and by changing over to flounder dragging or mackerel netting during the "off" seasons seems to be keeping busy throughout the whole year and also returning a fair dollar. The trap fishery of the district was very poor owing to the inclement weather with the resultant damage done to gear and also the fact that poor hauls throughout the season left little for encouragement. Mackerel, butterfish and Old England hake, on which the trap men depend mostly for their summer's work, were not taken in any profitable quantity, and as traps are quite expensive to operate, little or no money was made.

Smelt fishing, while it cannot be classed as a commercial proposition, is carried on quite extensively hereabouts and deserves mention in passing. In the early part of the season the fishing was very poor and very few fish were taken. As the summer came into its latest things improved and during the early and late fall many good catches were made. The fish were of a very good size and were fairly well distributed through the whole district. The demand for clams is constantly on the increase, and with the closing of so many of the flats on account of contamination, the open areas are being greatly overdug with the inevitable result of the clams getting scarcer and scarcer. The clams are reproducing wonderfully, but it stands to reason that they cannot stand the strain forever and this situation is one that should receive considerable attention and study, lest before we are aware, this luscious bivalve be threatened with extermination. The clam industry furnishes employment to a great many men and as a food supply is one of considerable consequence. While the cities and towns are more or less jealous of their rights in regard to the control of the clam flats within their baliwicks, still it might be well if the State looked into the situation as it is at present, try to meet cities and towns on some common ground and all act together for the good of the industry as a whole.

As to the fisheries along the Lynn and Swampscott coastline and towns contiguous, the traps did very poorly; indeed it is not too much to say that they were operated at a loss for the season as a whole. The gill netters found their fishing fate so poor that after a very short season, principally owing to low prices of splendid shore fish, they went into lobster fishing quite a little bit earlier than usual. It was but two or three years ago that the big menhaden or "porgy" steamers made their largest and quickest hauls in this vicinity. This year but two or three of these crafts entered the bay, and as far as known, all of them not only made no sets but saw no "porgies."

Checking up on the outside, from Marblehead across to Quincy, it is found that the crab fishery has increased to a very great extent. Pos-



sibly this is owing to the scarcity of lobsters and the demand of a crustacean of similar fine fibre. Certain it is that a great many men are now engaged in this business of taking crabs and also of preparing them for family trade. The prices are such that makes it profitable not only to the fishermen themselves, but to the dealer and the many people who are engaged in removing the meat from the shells, placing them in delectable condition in ventilated tin packages. In this district crabs have been very plentiful and bring a price of from 1 to 2 cents each. This may seem a small figure, but our deputy informs us that on a morning in late October he saw a load of crabs on their way to the Boston market, there to be picked and placed on sale, which numbered 60,000 in count.

In this district only a very small quantity of mackerel and other free swimming fishes were taken as only a very few men engage in seining in this district. Herring had been plentiful, however, and extremely large quantities taken, the prices running from \$1 per barrel to sometimes twice that amount. Haddock have not been very plentiful, the gill netting fishermen usually getting the majority of large catches and occasionally a lot of whiting and hake, the latter being at times very plentiful. What is believed to be the largest quantity of quahaugs ever taken in this district was taken this year. On one occasion two men gathered ten barrels on Lynn beach, which sold at \$7.50 per barrel.

Nearly all of this district is closed to the taking of clams in accordance with Chapter 370, Acts of 1926. Up to the time of the closing of Revere Beach in accordance with this chapter, the largest quantity of clams were taken in this area. Any day one could count from 70 to 100 men digging, they receiving what is estimated from \$3 to \$4 per barrel for their efforts. A large quantity were also taken from Snake Island, Winthrop, but this area has also been closed. At present, Swampscott beach is an open territory, but no commercial diggers are allowed to operate there, owing to the fact that the area is small and the town authorities keep it for their own residents. Practically the rest of this whole district is closed under the Pollution Act, so-called.

Speaking of Boston harbor, it can be said that the lobster fishing in and around this port was very poor during the past season. The fishermen lost a great part of their lobster pots owing to the heavy winds and bad storms. Smelt fishing in Boston harbor showed a marked increase over several seasons past, indeed the fishing could be called very satisfactory. Herring were found in all parts of the harbor in very plentiful quantities.

Down along the Scituate shore and contiguous territory the mackerel fishing was not very good. For a few days these fish struck in off Plymouth, but there were no catches of any great amount. Small catches of cod and haddock were also made. The herring fishery this year in this vicinity was very good everywhere along the shore. All reports are to the effect that there has not been such a run of herring for many years. The smelt season was very good this year also. In Plymouth waters they have not found many smelts for about five years. This year, however, the fishing there was very good indeed. Scituate and Hingham both had a splendid run of fall smelt, so much so that the fishermen themselves agreed, after splendid catches during the fall season, that the smelt has come back "strong." Along the Duxbury and Kingston shore, codfishing has been below normal and smelting is reported very poor; also but few mackerel came in. In this district it should be remembered, however, that the fishery is not of a business nature but mostly for the delectation of private individuals and parties who go out to enjoy a day's fishing and engage from some local fishermen what is known as a "party" boat.

The situation along this territory, with especial reference to Plymouth might be sized up as follows:

Clams—The catch has been good in the open areas.

Oysters—None in this district.

Quahaugs—None in this district.

Scallops—None in this district.

Mackerel—Rather a small catch as compared with last year.

Codfish—About the usual catch.

Haddock—Rather a small catch.

Herring—A good catch of large sized fish.

Along from Marshfield and down to Weymouth including Cohasset, Scituate, Quincy and other places which touch upon the sea, our regular correspondent reports as follows:

"Generally speaking I should say that catches of all kinds of fish with the exception of smelt were practically the same as last year. There is little or no commercial fishing along this shore; most of it is done by city people down for a day or week-end. Day after day I have seen "party" boats come in about noon with their tubs full of codfish. When I asked why they came in so early the usual reply was that their bait was all gone."

Last winter in this district the smelting through the ice was fair but the fish were unfit for food because of oil pollution. This summer it has been a different story, however, for up to the present time, November 15, fishing all through this section has been especially fine. Most any one who knows the smelting game at all can get from five to ten dozen a day with no sign of oil in or on them. From time to time our deputy in this section has received reports of day's catches of from 40 to 50 pounds of smelts, which is certainly "high line talk."

Summary of the reports of the shore net and pound fisheries, as required by Section 148, Chapter 130, G. L. follows:—

Number of men engaged, 139; number of boats, 105; value of boats, \$40,149.40; number of fish pounds, 51; value of fish pounds, \$73,402.97; number of nets, 624; value of nets, \$12,646; catch in pounds:

Alewives	82,562	Sea bass	3,332 <sup>3</sup> / <sub>4</sub>
Bluefish	7,396 <sup>1</sup> / <sub>2</sub>	Sea herring	743,462
Flounders	75,254	Shad	5,592
Mackerel	727,240 <sup>3</sup> / <sub>4</sub>	Squeteague	3,279
Menhaden	12,048	Striped bass	4,095
Pollock	1,136	Squid	850,575
Salmon	40 <sup>3</sup> / <sub>4</sub>	Tautog	25,084
Scup	112,047 <sup>1</sup> / <sub>4</sub>	Other edible or bait species	1,946,069 <sup>1</sup> / <sub>2</sub>
Total pounds, 4,599,214 <sup>1</sup> / <sub>2</sub> ; total value, \$126,555.66			

#### THE LOBSTER FISHERY

The lobster situation demands some plain speech. We stated the case in an article published in the Vineyard Gazette during the fall, which we think will bear repetition.

"We have known for years that our present laws to protect the lobster are absurd. We are killing off the brood stock without any restrictions whatever. We are permitting the sale of lobsters, many of which are killed before they have reproduced. Such business methods would promptly bankrupt the owner of a commercial fish hatchery, or any breeder of any kind of live stock. The only reason that there are any lobsters left on the coast of Massachusetts is due to the fact that it has been physically impossible for the fishermen to catch all the stock. Due to this fact the lobster is not likely to become extinct, but the industry may fall off to where there is no profit in it for anyone. But one thing is certain—we will continue to dribble along with a negligible production until such time as the situation is taken firmly in hand and some common sense business methods of handling it are adopted.

"There is still a great deal to be learned of the mysteries of the sea. We have seen certain species of fish disappear from a given region for a



period of years, only to return in large numbers at some future date. Too often we take refuge in such facts, postponing action in the hope that some phenomenon will bring back the lobster supply. But the history of this fishery is more easily traced than that of certain species of fish, for we are informed of the life cycle of the lobster, and we know its breeding grounds. Fundamental business practices can be applied to this industry, and it is simply a question as to whether the Legislature will do it.

"It has been claimed in some quarters that our existing lobster laws are the result of ignorance. There is no ignorance about it whatever. The lobster fishermen know exactly what they are doing. They know just as well as any other group of our people that the brood stock must be protected and the young be given an opportunity to reproduce if this species is to be increased. But these men, as a class, are actuated by the motive that they are going to get theirs while the going is good. The individual fisherman does not want to return an egg-bearing lobster, or a large breeder, or an immature fish back to the water for fear that some other fisherman will catch it and keep it. They want the minimum of restriction on their operations. They are opposed to any laws that will prevent them from taking the maximum number of lobsters regardless of size or condition. When the fish become exceedingly scarce in some region, the fishermen may be sobered up for the moment to the point where they are willing to advocate certain reforms, but let there be an increase, however slight, the following season, all such plans are thrown into the discard, and each man goes out to get all he can regardless. The lobster-consuming public along the shores has played some of the lobster fishermen for a bunch of suckers. These fishermen, for the sake of a dollar, have run the risk of violating the laws and being put out of business in order to bring in shorts and sell them to these people at a low price. If they had left these shorts in the water until they could be marketed as "counters" they could have gotten a fair price. Thus the fishermen have been gradually undermining their industry instead of standing together and making the public pay a fair price for a right product. The same thing is true of brushing the eggs from berried females, and so on down the line.

"The fate of the industry lies with the fishermen themselves. If the lobster ceases to be a factor, no one else will be to blame. The fishermen can have the laws they want. They can comparatively easily block any laws they do not want. Nothing is to be gained by maudlin sentiment on this subject. Anyone who has followed legislation closely in any state for a period of time knows how easily a militant, small minority can block desirable legislation where the majority is indifferent. The rank and file of our people are little interested in the fate of the lobster. It would be exceedingly difficult, if not impossible, to arouse the majority to such an extent that the militant opposition of a small minority could be overcome. This is a pretty strong indictment of the fishermen, but it is time that the public had the unvarnished facts in the case.

"The opinions of the fishermen differ so widely that it is hopeless to expect a sufficiently broad agreement on any one policy of far-reaching benefit to the industry. In the last analysis it gets down to this—the lobster industry in Massachusetts will continue in its present unsatisfactory condition, and will continue to decline to lower levels, until the lobster-eating public successfully insists on protective legislation, or the present generation of fishermen is replaced by others who are willing to apply business methods to upbuilding the industry."

During the spring, from shipments from Nova Scotia, New Brunswick and other points outside the State, there were seized at Boston 123 egg-bearing and 15,213 short live lobsters, all of which were distributed on favorable lobster locations along the whole State coast.

The totals of the tabulation of the returns of the year's fishing, re-



quired of the lobstermen by law, follow. The period covered is Oct. 20, 1926 to Oct. 20, 1927.

Number of men engaged in the fishery, 721; number of boats, 882; value of boats, \$222,923.20; number of pots used, 44,213; value of pots, \$119,443.50; number of lobsters taken, 1,112,104; pounds of lobsters, 1,668,156½; value of lobsters, \$628,151.62; number of egg-bearing lobsters taken and returned to the waters, \$12,524.

As required by Chapter 130, Section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1927 was 1,255.

#### BOUNTIES ON SEALS

The following towns were reimbursed by the Commonwealth for bounties paid on seals under Chapter 130, General Laws, Section 155; Barnstable, \$4; Chatham, \$2; Duxbury, \$22; Edgartown, \$2; Georgetown, \$2; Ipswich, \$56; Orleans, \$2; Plymouth, \$6; Provincetown, \$10; Rowley, \$6; Yarmouth, \$88; fees to treasurers, \$50.

The seal herds off our shore have increased to the point that they must come in for future consideration. They are difficult to pursue and kill. They not only are tenacious of life, but the killing must be done under circumstances where it is quite difficult, in most instances, to salvage the carcasses in order to obtain the evidence to collect the bounty. Under these circumstances we believe that an increase in the bounty making it \$5 would be a cheaper way of keeping these herds reduced than by the State purchasing gear (such as seal nets and boats) and hiring men to make the reduction.

#### MOLLUSK FISHERIES

The usual annual survey of the shellfish areas was made by the biological department, assisted by the coastal wardens and certain of the regular wardens. Statistics and details of the survey are in the office files.

An appropriation was made this year sufficient to continue the five coastal wardens originally appointed under the provisions of Chapter 370, Acts of 1926. It would appear that this is to be a fixture in our activities for an indefinite period.

#### *Clam*

In our previous report we called attention to the substantial percentage of what were former producing clam flats from which the diggers are now barred, due to pollution. In the main this pollution is not such as to endanger the life of the clam, and therefore from the beginning we have had under consideration ways and means by which clams from contaminated flats may be rendered wholesome for food.

Pursuant to Chapter 33, Resolves of 1927, the Department of Conservation was authorized to investigate the feasibility of transplanting shellfish from the contaminated areas to clean areas in cribs or otherwise, to see whether, within a reasonable time, they would purge themselves of pollution, and if so, whether they could be handled in this manner on a sufficiently large scale to be practicable as a commercial proposition.

The Department of Public Health, upon the request of the Department of Conservation, was authorized to investigate as to the feasibility and practicability of rendering such shellfish safe for use as food by means of disinfection or otherwise. These departments were to report to the Legislature as of December 1, 1927. Our department reported that, as a result of its investigations, assisted by the Department of Public Health, it is impracticable to treat soft-shelled clams by transferring them from the polluted waters to clean waters. It is found that the loss due to transportation, to natural enemies, and possibly to damage in digging, was at least ten percent, and furthermore, after the necessary safe period of submergence in clean waters, which is at least three weeks, the clams were apparently not as active or of as palatable a quality as soft-shelled clams freshly dug.

The Department of Public Health found that it is practicable to purify

clams by the use of chlorine. Investigations were conducted by it in a plant constructed under the Plum Island Bridge in the city of Newburyport, both during the summer when the water temperatures were high, and late in the fall when they were comparatively low. While the plant was a small one, it demonstrated that soft-shelled clams can be satisfactorily purified by chlorine treatment in two days or forty-eight hours, and generally in twenty-four hours. It states that it seems reasonable to believe that similar satisfactory results could be obtained in the operation of a large plant. The cost of chlorine would be small, the plant would not have to be expensive, and the principal cost would be the adequate salary of a chemist or bacteriologist, whom it would be necessary to have as superintendent of the plant in order that the work might be satisfactorily carried on, and continual determination made of the efficiency of the treatment.

In conclusion the two departments agreed that, in the light of their joint experiences in the past two years in trying to exclude the public from the sources of the contaminated flats (particularly such areas as Boston and Lynn harbors), the handling of such an enterprise as a chlorination plant, dealing as it would with a commodity in the first instance highly dangerous to public health, would have to be on a strictly business basis, and surrounded with such protection as would eliminate the exposure or risk to the public. The flats could not be thrown open to digging by the general public. It would be necessary to restrict the exploitation of a given territory to some one individual, or group of individuals operating under a corporate organization, properly licensed by the State, to the end that responsibility could be narrowed down, proper rules and regulations applied, and adequate supervision insured.

The report also stated, "we do not believe it would be advisable for the Commonwealth to set up a reclamation plant adjoining any of the polluted clam flats, but the construction and operation of such a plant might well be carefully considered by the municipality within whose borders such flats are found."

Information obtained through the shore wardens from the diggers and those engaged commercially in the business, indicates that the season in most sections of the State where clams were dug averaged fair, though in several sections there was a poor season. The market prices for clams ranged considerably higher than in 1926 (in fact, in most cases the highest ever obtained). The total production in the State was less than half the quantity of clams dug in 1926.

### *Oyster*

A normal year was reported from the districts in which oysters are taken. In fact, statistics collected indicate that the production was considerably greater this year than in 1926, and the prices averaged about the same.

### *Quahaug*

In connection with the investigation by our department of the feasibility of transporting shellfish from contaminated areas to clean areas to see whether within a reasonable time they would purge themselves of pollution, and if so, whether they could be handled in this manner on a sufficiently large scale to be practicable as a commercial proposition—we found that there was much merit in the transportation of quahaugs taken from contaminated areas, into clean water, where they can readily dig themselves in and reach their natural environment.

Statistics obtained from diggers and those engaged in the quahaug business commercially indicate a prosperous season in most of the sections in which quahaugs are collected. Prices in most instances were considerably higher than ever before obtained and the production was decidedly greater.



*Scallop*

A prosperous year was reported by the towns in which the best scallop waters are located. The data collected indicates a poor year from most of the other towns. The production and prices were considerably higher than those of 1926.

The usual annual check-up of the alewife fisheries in the State was made during the spring and summer. This included the continuation of efforts to open all streams from headwaters to sea; the construction of fishways where necessary; the upkeep and keeping in correct working order of present fishways, and in addition, collecting data on all alewife runs in all streams in the spring; planting alewives of spawning age in depleted streams; and the brief yearly survey of the industry from a commercial standpoint.

Statistics were obtained wherever possible on the commercial fisheries and these are on file in the central office. The reported catch of alewives for the year showed a slight increase over last year's figures—10,264 in 1926 against 10,508 in 1927.

There were a number of streams on which seining and fishing privileges were sold during the year, and while large numbers of fish taken from these streams, the lessees in many cases made certain that large numbers of fish were allowed to run to the spawning beds, particularly where a lease extends over a period of years. Streams which were leased or on which seining privileges were sold report prices from \$5 to \$2,000—some of these extending over a five-year period. The prices on alewives caught and sold during the spring run were obtained from those engaged in the industry wherever possible, and prices ranged from 75 cents to \$4 per barrel.

The transportation of alewives of spawning age continued and 2,094 were planted (see Fish Distribution). The results of these stockings are proving most successful, for thousands of young fish are seen returning to the sea in the fall.

Respectfully submitted,

WILLIAM C. ADAMS

*Director.*



## APPENDIX

## RECOMMENDATIONS TO BE CONTAINED IN THE SIXTY-SECOND ANNUAL REPORT OF THE DIVISION OF FISHERIES AND GAME FOR THE YEAR 1927.

The Director respectfully recommends the passage of the following laws:

*Salary of the Director.*—Owing to the steady growth in the volume of business in this Division, it is the opinion of the Commissioner that the Director is not receiving a salary commensurate with his duties and responsibilities. Inasmuch as the salary of this position is fixed by statute and could not be considered at the time of the recent classification, the Commissioner recommends that it be increased such an amount as will bring it up to the standard fixed for positions of similar responsibilities under said classification.

*Fishing in Inland Waters.*—In this recommendation we propose to strike out, in section 3 of the license law, the words "stocked by the Director or his predecessors since January 1, 1910." That provision makes it unnecessary for any one to take out a sporting license to fish in any of our inland waters which have not been stocked since January 1, 1910. There is no excuse for retaining it on the books. A sporting license should be required of all those who fish on the inland waters of the Commonwealth, no matter when such waters were stocked.

*Public Rights in Certain Great Ponds.*—From 1647 up to 1869 the right to fish in all natural great ponds of ten acres and upwards was preserved to the inhabitants of this Commonwealth. In 1869 a law was passed which took away such public rights to fish in all such natural great ponds between ten and twenty acres, and gave the owners of the land around such ponds the control of the fisheries therein. As a result such riparian owners are now in a position to exclude the public from these natural great ponds between ten and twenty acres, thus defeating a right which the public enjoyed for over two hundred years. We believe that this (now embodied in section 24 of chapter 130 of the General Laws) should be repealed, and the public right of fishing in such natural great ponds between ten and twenty acres should be restored.

*Sporting and Trapping Licenses.*—Under existing law only the city and town clerks can issue sporting licenses. They retain twenty-five cents as their fee. In other words, one-ninth of all the money contributed by the anglers and hunters is absorbed by these agencies. There is a growing tendency in administrative circles to require each department and division of the State government to be as nearly self-supporting as possible. The total income from licenses and fines has a direct bearing on the total appropriations for this Division. If the license law is amended to permit the Division to employ additional agencies to issue licenses we believe we can build up a group which will handle the licenses without charge. We refer to sporting goods houses, etc. Without going into all the details it is sufficient to say that such agencies can be handled on exactly the system now being used with the city and town clerks, and the interest of the Commonwealth can be protected through a blanket insurance policy automatically covering all agents so appointed. The plan does not contemplate taking the right to issue licenses away from the city and town clerks. It proposes to add additional agents through which some of the fees can be saved to swell the total annual revenues; to make it more convenient for the public to purchase licenses; and to provide a system by which we can reach and sell licenses to a substantial portion of our people who are not interested in hunting and fishing, but who enjoy the outdoors and would purchase licenses to help along the cause if we had the means of injecting the element of salesmanship into the license distribution system.

*Salary of Town and City Fish and Game Wardens.*—The law provides

that cities and towns may appoint a local warden to serve under the direction of the Division, and whose salary shall be paid by such city or town; also that such salary shall not exceed \$100. If this restriction was removed we believe that some cities and towns would be willing to pay a larger salary, with a result that the warden would give a larger amount of service, with a corresponding benefit to the work of law enforcement, than is now the case.

*Fishing in Inland Waters.*—This recommendation is to prohibit all fishing except for trout in February, March and April. The views of the Division on the subject of winter fishing are too well known to require repetition. Last year we stated: "The demand on the fish stock in our ponds and streams is so great that we do not believe even present supplies can be maintained so long as the present open seasons continue." We cannot artificially propagate pickerel, horned pout, perch, etc. Yet the open seasons on these species are much longer than those on trout, which we can propagate. We cannot expect to keep up our stock of pickerel so long as we continue to take them (with the use of ten traps and a catch limit of fifteen a day) right up to the actual spawning season. We do not wish to suggest any restrictions on any branch of the sport that can possibly be avoided, but the time has come when we must face this issue squarely. If all fishing in our inland waters were prohibited during the months of February, March and April (except trout fishing on and after April 15) we would be taking a step in the right direction, and establishing a clean-cut law that could be enforced.

*Taking of Wild Birds.*—This recommendation is to prohibit the taking of all birds by the use of traps, nets, snares and jack lights. Under existing law these devices can be used to take birds which are not protected by law. This gives aliens the opportunity to set up such devices, and our wardens cannot prosecute them unless they catch such persons in the act of taking a bird which is protected. A warden can find such devices set up but he is powerless to prosecute until the operator is caught red-handed in the act.

*Certain Apparatus in Inland Waters.*—The law prohibits the use of nets and seines in our great ponds, but does not cover our other inland waters. As a result we have been unable to prosecute a number of cases where aliens and others have been using such devices to clean the fish out of some of our brooks and larger streams. We believe that these provisions should apply to all the inland waters of the Commonwealth, and thus give us a law that our wardens can enforce.

*Damaging or Stealing of Property while Hunting, Trapping or Fishing.*—Many complaints are received of the wilful or negligent injury to property on the part of persons hunting or fishing. It is the desire of the Division to protect land owners against the depredations of persons who do not respect the privilege which they have of hunting or fishing on private property. To accomplish this the wardens should be empowered to arrest and prosecute any person whom they find destroying, stealing or injuring property. Our wardens spend the greater portion of their time in the back country regions, and we believe they can be used as a valuable police force in the remote rural districts.

*Possession of Certain Wild Birds.*—The present law protecting wood ducks, gulls, terns and other non-game birds does not provide a penalty for the illegal possession of such birds, and in order to secure convictions a warden must find a person in the act of killing the bird. It is often very difficult to do this, and in order to make the law uniform with other sections of the game laws a change is recommended which will penalize the possession of protected birds as well as the killing of them.

*Lobster Permits.*—Under the present law the Division issues permits regulating the sale of lobster meat. In furtherance of our efforts to make this Division self-supporting while at the same time enlarging our facilities to render increased service to all activities included within it, we are



recommending the provision of a fee of \$5 in order to cover the cost of issuing these permits and the supervision of the places where lobster meat is sold.

*Revocation of Lobster Licenses.*—Under the present law a lobster fisherman's license is revoked for a second conviction of certain specified violations of the lobster laws. Many times a lobster fisherman can repeatedly violate other provisions of the lobster laws and continue to engage in lobster fishing. It is the opinion of the Division that when a man is convicted a second time for any violation of the fish and game laws his license should be revoked for a period of one year.

*Taking of Fish by Means of Torches in Certain Waters.*—Under the present law the Division is authorized to issue permits for the torching of herring in certain waters adjacent to Boston Harbor. To efficiently enforce this law requires the outlay of considerable money, and if the operations of the persons who have these permits are to be supervised and their rights protected they must be willing to pay a license fee sufficient to cover the cost of such service as other persons do who benefit by the service of the Division. It is felt that a fee of \$50 is reasonable in view of the fact that this law will result in a larger return on their investments. Unless the torching operations are carefully supervised much damage to shipping and wharf property may result from the careless use of torches and their contents.

*Taking of Lobsters and Crabs.*—At the present time no license is required to set traps for the purpose of catching crabs, yet the traps used in this fishery will take lobsters, for the taking of which a license is required. Unless this law is extended to cover the taking of crabs it will be impossible to enforce the lobster license law as it should be enforced. This act will also impose a penalty upon any person who obtains a lobster fisherman's license by making false representations.

*Sale and Cold Storage of Fresh Food Fish.*—This change in the fish inspection law is asked for because, after seven years of enforcement of the same, it is found necessary to make section 82 definite, and to thus carry out what was actually the intention of the law as it was passed in 1919. It has been found in presenting cases to court that there is a condition of affairs, when cases are brought under the "third-grade fish not be sold at retail," which makes it at times a question as to conviction or otherwise. Some lawyers are bringing up the point that because a market sells goods to a restaurant it is really a wholesale place. This was not the intent of the original law, and so it is found necessary to strengthen the present law and yet not go outside the bounds of the original intent to make the changes as are suggested herewith in section 82. It is well known that in the original law the terms "third-grade" and "wholesale" were meant to apply to vessel loads or parts of vessel loads of fish and to real wholesale dealers of Boston and Gloucester. The proposed change will greatly strengthen the act and work for the betterment of the fish-consuming public of the Commonwealth.



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The Commonwealth of Massachusetts

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ANNUAL REPORT

OF THE

*Mass. Dept. of Conservation*

Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1928

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DEPARTMENT OF CONSERVATION



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## The Commonwealth of Massachusetts

The Director of Fisheries and Game herewith presents the sixty-third annual report.

### GENERAL CONSIDERATIONS

The protection and propagation of wild life throughout the country has developed very slowly, due very largely, if not entirely, to the fact that the rank and file of anglers and sportsmen have always regarded fishing and hunting as cheap sports. It was only a few years ago that this group of our citizens highly resented the suggestion of a license fee as a medium through which they should contribute toward the maintenance of an adequate wild life stock. The original hunting and fishing license fees were ridiculously small, but they were the best that could be obtained considering the existing sentiment. While times have changed and the anglers and hunters more clearly perceive the reasonableness of the proposition, nevertheless the work of protection and propagation drags, due to the fact that we still persist in regarding hunting and fishing as sports which can be enjoyed at small cost. A large percentage of us still persist in nursing the hope that some miracle will occur to restore the abundance of the past. Too many of us insist on harboring the fallacy of the God-given right of free hunting and fishing. Some still nurse the chimera of a so-called American system of free fishing and hunting. These ideas must be thrown into the discard once and for all if we are to deal with this problem on its merits.

The protection and the propagation of those forms of wild life which are used for sporting purposes is today recognized as a business. We hope their pursuit and capture in the wild can always be surrounded with some of the romance of earlier days. But this will have to result from the cultivation of a vivid imagination rather than from the actual reality.



Though the process may be painful, the time has come to talk in terms of relative values, and in a comparative way, of past, present and future opportunities to enjoy a day afield. In the densely settled sections of the country it is useless to hope for the return of certain species of large mammals classed as game. Likewise it is nursing a dream to expect, in the future, to fish in crystal streams flowing through primeval forests. In many of our streams and other waters, natural reproduction of fish life cannot be counted on for any appreciable additions to the wild life stock. In many sections only the artificially propagated species of game (such as the pheasant) can be relied on for sport.

If we are correct in our premise, that providing certain species of birds, mammals and fish for sporting purposes is a business proposition, then the question of financing the enterprise is the most important consideration. Today all of the things the Division does for the anglers and hunters are financed entirely by appropriations based on the amount of the revenues from sporting licenses and fines. The present sporting license system has been in effect since January 1, 1926, and we have about reached our maximum revenue under the existing set-up. But the demands for an increased volume of wild life to provide increased opportunities for recreation continue uninterrupted, and but two ways appear available by which to meet these demands.

The first has to do with increasing the revenues of the Division. Apparently this can be accomplished only by increasing the present license fees and by providing a system of issuing licenses whereby most of the fees now retained by the city and town clerks, may be saved. On many occasions we have stressed the fact that hunting and fishing may be regarded as cheap sports. We have pointed out that no equal volume of recreation can be obtained at the price of a sporting license, now costing \$2.25. It entitles the holder to either hunt or fish for something during every month of the year. The fair and democratic attitude of our land owners permits this to be done on lands which the license holder is paying nothing to maintain. Tested on any scale of values the present license fee is entirely out of proportion to the privileges represented in it, and should be substantially increased. Our request for legislation to authorize the Director to appoint volunteer agents to issue sporting licenses without charge has so far been denied favorable action in the Legislature. We have carefully studied the matter, and see no objection to, and every argument in favor of, adopting the Oregon system, whereby such volunteer agents (sporting goods dealers, hardware stores, etc.), handle the entire annual output of licenses without cost. The State could be protected against financial loss through the purchase of a blanket bond covering all agents as fast as chosen. The reasons that such agencies are willing to act *gratis* are obvious. No change in our present method of dealing with the city and town clerks would be required in order to handle any number of additional volunteer agencies. At present one-ninth of the entire sum paid for sporting licenses goes to the city and town clerks in fees. This year we issued 120,018 sporting and trapping licenses, and out of the total proceeds \$29,652.00 was retained by clerks. But the revenues from licenses and fines will never be sufficient to enable the Division to entirely meet the annual demands on our wild life stock. The State's work must be supplemented by that of individuals, which leads to the second possibility. This lies in the willingness of individuals and associations to either purchase or rear birds, mammals and fish to supplement the Division's work of protection and production. A great deal of interesting work along this line has been performed by individuals and clubs over a period of time. For some years we have annually provided them with eggs for hatching and rearing pheasants. Starting with a few thousand, the output during this year was 12,711 eggs. For some years certain local fish and game associations have built the pools and provided the food to rear to fingerling size small trout supplied by the Division.

Three years ago the foregoing group began to supply covered pens in which to carry through the fall and winter young pheasants from our game farms to be liberated the following spring as adult birds. Practically the entire output of pheasants from the game farms this year are now in pens so provided, and will be fed and carried through the winter without expense to the Division. A greater public participation in this work is bound to come as the possibilities are more fully understood by the rank and file.

The Division will encourage and assist in these matters by supplying the young stock as far as possible, and having its staff advise as to the suitableness of breeding pens and pools to handle the stock. It will only be a question of time when experts in our employ will devote practically their entire time to such work. In this way many individuals will be discovered who have real ability in game and fish breeding, and they will be encouraged to perfect themselves in the work. Many individuals and associations not in a position to do the actual work, will contribute by purchasing stock from commercial dealers, and we hope that this will result in the establishment of an increasing number of commercial game farms and fish hatcheries. There is a very great field for such private enterprises, not the least important feature of which is the fact that they are a guarantee of an increasing supply should the game farms and fish hatcheries of the State in a given year be ravaged by disease, floods or other disasters.

A further public participation in a sane program of vermin control is essential. Divisional agents can never adequately control the situation. The average hunter and fisherman usually is enthusiastic in his pursuit of game or fish, but at the end of the open season loses his interest, and does practically nothing through the periods closed to shooting, to assist in reducing to a harmless minimum certain predatory species that take an enormous toll in the course of a year.

With the Division functioning to the largest possible proportions by reason of a properly adjusted scale of license fees, assisted by individuals and associations along the lines indicated above, together with the establishment of an adequate system of permanent wild life sanctuaries, and enlarged powers for our wardens that they may be an effective rural police force to protect the rights and property of the land owners, we should be able to provide an increasing amount of wholesome, health-giving recreation. There is nothing Utopian in the picture. The employment of sound business methods, together with a willingness on the part of the rank and file to do their share, will bring the desired result.

#### PERSONNEL

On July 11, 1928 William C. Adams was reappointed as Director of the Division of Fisheries and Game.



# FINANCES

## Appropriations

	Appropriations	Expenditures	Balances	Corrected balances (See foot-notes)
<i>Maintenance</i>				
Salary of the Director . . . . .	\$4,000.00	\$4,000.00	—	—
Personal Services, Office Assistants . . . . .	10,180.00	10,154.73	\$25.27	\$25.27
Office Expenses . . . . .	7,500.00	7,381.06	118.94	118.94
Education and Publicity . . . . .	1,000.00	940.32	59.68	59.68
Enforcement of Laws:				
Personal Services . . . . .	66,000.00	63,781.65	2,218.35*	5,063.88
Expenses . . . . .	40,000.00	34,654.47	5,345.53*	
Biologists:				
Personal Services . . . . .	5,100.00	5,094.00	6.00	6.00
Expenses . . . . .	2,500.00	2,492.01	7.99	7.99
Propagation of Game Birds, etc. . . . .	99,700.00	99,608.55	91.45	91.45
Damages by Wild Deer and Wild Moose (Ch. 127, Acts 1928)				
Deficiency—Damages by Wild Deer and Wild Moose (Ch. 127, Acts 1928) . . . . .	9,000.00	9,727.41	1,945.85*	1,945.85†
Protection of Wild Life . . . . .	2,673.26			
Marine Fisheries:	3,400.00	3,393.55	6.45	6.45
Personal Services . . . . .	10,740.00	10,582.00	158.00	158.00
Expenses . . . . .	3,300.00	3,226.27	73.73	73.73
Enforcement of Shellfish Laws:				
Personal Services . . . . .	9,300.00	7,992.90	1,307.10	1,307.10‡
Expenses . . . . .	6,000.00	6,997.15	2.85	2.85
Purchase of Lobsters . . . . .	1,000.00			
	7,500.00	4,952.94	2,547.06	2,547.06**
<i>Special Appropriations</i>				
Improvements and Additions at the Fish Hatcheries and Game Farms . . . . .	10,000.00	10,106.31*	(Apparent Overdraft) \$106.31	2,393.69†
Bounty on Seals (C. 127, Acts of 1928) . . . . .	250.00			
Bounty on Seals (C. 405, Acts of 1928) . . . . .	350.00			
Deficiency Bounty on Seals (C. 127, Acts of 1928) . . . . .	200.00	800.00	—	—
	\$299,693.26	\$285,885.32	—	\$13,807.94
Less amounts available for use in 1930 . . . . .				4,339.54†
Amount actually returned to the Treasury . . . . .				\$9,468.40
Balance available from 1927 appropriation for Damages by Wild Deer and Wild Moose, expended in 1928 . . . . .	\$0.59	\$0.59	—	—
Balance available from 1927 appropriation for Improvements and Additions at Fish Hatcheries and Game Farms, expended in 1928 . . . . .	510.62	497.82	—	\$12.80

\* On Oct. 24, 1928, the Governor and Council approved a request of the Director that the sum of \$2,500 be transferred from "Extraordinary Expenses" to the appropriation of \$10,000 for Improvements and Additions at the Fish Hatcheries and Game Farms. This was on the understanding that an equal amount would be returned unexpended from the total appropriation of \$106,000 for Enforcement of Laws. Inasmuch as two years are permitted within which to make expenditures against the item for Improvements and Additions at the Fish Hatcheries and Game Farms, there was carried over into the fiscal year 1929 an unexpended balance of \$2,393.69. The remaining balance under Enforcement of Laws, \$5,063.88 (\$2,218.35 plus \$5,345.53 less \$2,500) was returned unexpended for the reason that we had asked for the sum of \$5,000 to reprint the fish and game laws, but during the year it was decided to postpone the printing of the laws for another year, or until the remaining original law books and supplements could be used up.

† Available for use in 1930.

‡ Two additional wardens were appointed to the coastal warden force, but not until October 19, since the appropriation for operating expenses was insufficient for any longer period of time.

\*\* The law authorizing the purchase of egg-bearing lobsters did not become effective until July 25. Many lobster fishermen liberated egg lobsters without seeking compensation.

## REVENUE

The revenue turned into the State Treasury for the period of the fiscal year was: for sporting and trapping license fees, \$241,870; (see detail below); payments to balance unsettled license accounts of previous years, \$37.70; lobster license fees, \$930.75; rent at hatcheries, \$332; sale of lobster meat permits, \$380; sale of shiner permits, \$305; lease of clam flats, \$15; sale of game tags, \$25.10; sale of confiscated goods, \$85.79; sales at hatcheries, \$175; sale of miscellaneous goods, \$22.94; fines turned into



P.D. 25

the State Treasury from county treasuries as a result of fish and game law violations, \$10,017.95; total, \$254,197.23.

*Detail of receipts from Sporting, Trapping and Lobster Licenses*

Kind	Total Number Issued	Gross Value	Fees to Clerks	Net Re- turn to State
Resident Sporting (\$2.25)	107,615	\$242,133.75	\$26,903.75	\$215,230.00
Resident Trapping (\$2.25)	3,547	7,980.75	886.75	7,094.00
Non-resident Sporting (\$5.25)	2,043	10,725.75	510.75	10,215.00
Non-resident Trapping (\$5.25)	48	252.00	12.00	240.00
Non-resident Sporting (\$2.25)	507	1,143.75	126.75	1,017.00
Non-resident Trapping (\$2.25)	10	22.50	2.50	20.00
Alien Sporting (\$15.25)	331	5,047.75	82.75	4,965.00
Alien Trapping (\$15.25)	9	137.25	2.25	135.00
Minor Trapping (\$0.75)	4,498	3,373.50	1,124.50	2,249.00
Duplicate Licenses (\$0.50)	1,410	705.00	—	705.00
	120,018	\$271,522.00	\$29,652.00	\$241,870.00
Lobster (\$1.00)	1,095	\$1,095.00	\$164.25	\$930.75

During the past several years we have annually discussed the financial set-up of the Division with the anglers and hunters, through the medium of letters to the local organizations. For many years there has been more or less indifference, on the part of those providing the revenues, as to the extent to which these are translated into appropriations. The first active interest displayed by any group occurred when the Dedham Hunting and Fishing Association filed with the Legislature this year, a bill to create a Massachusetts Sportsmen's Fund. In brief, it proposed to set aside the revenues from sporting licenses and fines in a separate fund, to be expended by the State in carrying on the work of this Division of direct benefit to those who provided the revenue. A public hearing was given by the Ways and Means Committee and the merits of the bill were ably presented by representatives of the Association. A large group of sportsmen, members of the Legislature and others attended the hearing. While the bill was given "Leave to Withdraw," nevertheless the discussion of it centered the attention of the public on the Division's finances. The appropriation to carry on our work of direct benefit to the anglers and hunters was larger than the revenues for 1927 by, roughly, \$5,700 which showed a tendency on the part of the government to clean up the arrears.

The situation was very thoroughly canvassed in the letter which we annually submit to the Budget Commissioner in connection with the forecast for appropriations for the succeeding year. This letter is, therefore, quoted in full, as follows:—

"November 15, 1928.

Hon. Charles P. Howard,  
Commission on Administration and Finance,  
State House, Boston, Mass.

Dear Commissioner:

"The following refers to the annual forecast filed by us for the annual budget. The total amount is large, but we feel we should reveal to you what this Division should have if it is to adequately meet the demands of the public.

"We are following the plan of recent years in sub-dividing the forecast into three parts. We will discuss them as follows:

"Part I. ADMINISTRATION OF CENTRAL OFFICE, AND THE PROPAGATION AND PROTECTION OF FRESH-WATER FISH AND GAME. When the present sporting license law was under consideration in the Legislature for 1925, it was tacitly understood by all concerned

that if this act were passed and additional revenues provided,—in the future annually a sum would be appropriated to do the things of direct benefit to the anglers and hunters (who pay in the money or cause fines to be imposed by the warden force), equal to this annual revenue. No one has ever disputed the foregoing statement.

“When a bill to provide a separate fund of these revenues was before the Legislature this year I took the matter up with His Excellency the Governor. I immediately drafted a statement of the substance of that interview and sent it to his office for confirmation, and later read it to the Ways and Means Committee. It is as follows:

“The Governor expressed the opinion that there might be some merit and interest in the plan represented by this bill. But he felt that it was embarking on a rather dangerous course to fix for certain purposes any portion of the annual revenue of the State. That while it might be productive of good, it might also result in tying the hands of the government at any time where it would appear that even greater good might result from the more open arrangement of the unrestricted budget system.

“That until it had been demonstrated over a period of years that a grave injustice had been done to those who were contributing the money that he felt it would be better to adhere to the present system. *But that it was his feeling that from year to year the income from these special sources should be for all practical purposes applied to the objects for which the funds were more particularly provided.*”

“I call your attention especially to the last sentence (the italics are mine.)

“Attached hereto is an analysis of the revenues and appropriations since this new law went into effect on January 1, 1926. It shows that \$45,266.43 of these revenues have not been appropriated for the direct benefit of those who paid in the money.

“On the basis of the above, we believe it is only just to these anglers and hunters that from January 1, 1926 on, these revenues should be handled as a continuing account. If they paid in the money and it was not appropriated in a given year, or if for good business reasons an appropriation was not entirely spent—it should not be argued that the balance lapsed. These are special funds, contributed for special purposes. If the purposes were not annually present the State would not receive this money. If the State were not doing these things for the anglers and hunters no one would think of imposing such a license system to increase the general revenues. Therefore, if the State accepts these revenues for specific purposes it constitutes a trust and the entire amount should be devoted exclusively to those purposes. Whether it is all done in a given year is immaterial—so long as it is done over a period wherein there is no more delay than the complexities of State administration make necessary. In a number of States these revenues are carried as a special fund. If they are not all spent in a given year the balance is added to the fund.

“In this analysis we have charged against the annual revenues every item which we consider was of benefit to the anglers and hunters. In addition we have assumed the payment of deer damages for 1926 which was never contemplated even in the budget for that year. We have included such items as all the salary of the Director and the salaries and operating expenses of the office force, all telephone charges, etc.,—although a considerable amount of time and some expenditures were made on behalf of the marine fisheries and the non-game wild life of the State. Also all the cost of maintaining the Heath Hen Reservation and Penikese Island Sanctuary, in 1926, and part of such cost for 1927 and 1928. We maintain these are of greatest value to the lovers of non-game birds. The



Heath Hen ceased to be a game bird fifty years ago. Penikese Island was set apart as a sanctuary primarily to protect the great colony of terns on it.

"From this analysis it appears, on a conservatively estimated basis, that the annual revenues for 1928 from licenses and fines will be about \$253,677.54. A revised estimate of the income for 1929 indicates revenues of an equal amount.

"In making up your budget for this Division for 1929 we believe that to the foregoing sum should be added the \$45,266.43 arrears, and that the total amount of the budget to do the things of direct benefit to the anglers and hunters should be not less than \$298,943.97—or a round sum of \$299,000.

"In this we are asking nothing more than the return to the anglers and hunters of the money they have actually provided. In previous letters accompanying the annual forecast we have pointed out that it would be good business to increase the annual appropriation to more than the actual cash paid in,—say an additional ten per cent. The work of this Division must enlarge if we are to begin to meet public demands on it. This means larger appropriations. To lay the basis of these larger appropriations we need more revenues. The hundred and twenty thousand sportsmen involved pay their share of the general taxes. Were they encouraged to pay larger special fees by the State appropriating annually a sum in excess of those fees, we could build up the Division at a relatively small cost to the general tax payers. This is about as far as we can go in applying the self-supporting principle to any division of the government.

"Attached hereto is a memorandum in which I have made an allocation of the above sum of \$299,000, for your consideration.

"In this memorandum we have included an item for the payment of deer damages, but we continue to do this under protest—insisting, as we did in our letter of November 28, 1927, that these deer damages should be paid for by funds raised by general taxation. No one will oppose the proposition—that the maintenance of an abundant stock of all forms of beneficial wild life is a highly desirable part of our State and national existence. It adds to the joy of living of our people to such an extent, that it can rightly be considered a basic requirement in our every-day life. It provides an aesthetic influence with which we cannot afford to part. But this body of wild life cannot be preserved without expense. If its maintenance injures one of our industries to the extent that it is advisable to reimburse the industry for damages, the cost should be paid out of the general tax levy as part of the price which we pay to preserve a wholesome, well-balanced community life. The only important item is destruction by deer to certain growing crops and trees. This cost should not be charged to the anglers and hunters who today are the only ones contributing toward the maintenance and increase of this wild life, although it is beneficial to all our people.

"Also in this memorandum we show that the greatest need of the Division right now (in this part of our activities) is for a large appropriation under the item of 'Specials: Improvements and Additions at Game Farms and Fish Hatcheries.' This would enable us to do two things—(1) purchase all the lands and buildings thereon which we are now carrying under leases with options of purchase at prices stipulated in the leases; and, (2) make needed additions to our existing plants to enlarge their production to meet the growing demands. We especially need more rearing space at our game farms.

"Some of these lands we have been carrying for years at annual rentals running from six to ten per cent of the purchase prices. His Excellency the Governor looked into this matter last year. At his request I gave him a list of all our holdings. Also a statement showing they are inseparably tied in with our work and that we should own every one of them. Commenting on the situation he wrote to me on February 23, 1927 as follows:



"Please accept my thanks for your memorandum giving me the list of holdings that the State owns or is hiring for wild life development.

"Will you give me an outline of your future requirements? Is it your opinion that we own or are hiring all the land we need? and if not, what are your future plans?

"For example, if you have all the land you think we are going to need for a while, I think we might well consider purchasing the \$5,000 worth of land that we have at the Ayer Camp. The \$400 rental represents the equivalent of 8% on \$5,000. I am assuming that our use of the farm is aiding in its value all the time, and that being the case I should think if it is a valuable and essential possession for the department that we better buy it than hire it.

"At Sutton, on land the price of which is \$2,000, we are paying a rental of 10% or \$200, both at the Stockwell Ponds and at the Fish Cultural rearing unit.

"At East Sandwich, the rental runs over 10%, as it does at Amherst and Sunderland."

"Since 1922 we have received the following appropriations for 'Specials': 1923, \$4,750; 1924, \$4,800; 1925, nothing; 1926, \$5,000; 1927, \$8,000; 1928, \$10,000. It is hopeless with such sums to take care of the annual repairs and replacements, purchase lands and expand our six fish hatcheries and four game farms to keep up with the demands for more stock.

**"PART II. NON-GAME BIRD RESERVATIONS AND WILD LIFE SANCTUARIES.** We continue to include in this sub-division the cost of operating the Martha's Vineyard Heath Hen Reservation and the Penikese Island Sanctuary. As we have stated over and over again, the Heath Hen Reservation cannot possibly be considered as a sporting proposition. While we maintain a limited number of cottontails and a few quail on Penikese Island, as well as decoys to try and make it a way-station for wild fowl, it was set aside as a sanctuary primarily to protect the magnificent colony of terns which has occupied it for many years. In a statement to the local fish and game associations on February 20, 1928, reporting on the hearing before Ways and Means on the bill to establish a separate fund of license fees, I tried to smooth over the fact that part of the revenues would be used to maintain these two stations. This was done to allay a strong resentment against the defeat of this bill. It was not an admission that such costs should be included as a charge against these revenues.

"This sub-division contains some of the things the State should do out of the general tax levy to supplement the things which the anglers and hunters are paying for, in order to protect and preserve our wild life as a whole. The inland wardens, supported entirely by the anglers and hunters, protect the song and insectivorous and non-game birds. Our game farms and fish hatcheries are sanctuaries for such birds, and much of the time of the employees of the central office is taken up in the interest of this stock.

"During past years individuals and organizations have deeded to the State lands to be sanctuaries. While these are relatively small, much can be done to enlarge their usefulness. Such action will stimulate these donors and others to enlarge these areas, and provide funds to help out.

"In this part we are asking for the funds to establish one or more wild life sanctuaries. On February 24, 1927, I reported to His Excellency the Governor on this subject, as follows:

"Aside from the several small parcels which have been contributed by the Federation of the Bird Clubs of New England and

others, together with the Martha's Vineyard Reservation, and Penikese Island, we have no lands acquired primarily as wild life sanctuaries. Our State Forests and some of the sizable tracts under the control of other departments are, to a certain extent, such sanctuaries. But the first group was acquired primarily for reforesting purposes, and the latter group for the uses of the institutions. The selection of areas to be permanent wild life sanctuaries involves considerations quite different from those controlling the purchase of the last two groups. A sanctuary should include upland, meadow and swamp, in order to provide living conditions for the many varieties of desirable wild life. Reforestation is a minor consideration. Many parts of a sanctuary would be flowed, where possible, and even some forested areas would be cut back in the interests of bird and other animal life.

"Setting aside of an area as a sanctuary and the prohibition of hunting or fishing does not make such tract a sanctuary in the modern business of wild life conservation. In fact, these are only the first steps. To begin with, the tract should be large enough to permit of economic development as a sanctuary. It should be from two to four miles square. There should be a resident superintendent who will post the area, keep off poachers, trap vermin systematically throughout the year, plant food-bearing cereals, shrubs and trees, do the damming and cutting above referred to, carry on a limited amount of artificial propagation, and feed during the winter. After such sanctuary has been well stocked, annually a limited portion of the increase could be trapped up and liberated on other sanctuaries.

"The establishment of say ten such sanctuaries, evenly distributed across the State, is the only permanent guarantee of the maintenance of a stock of wild life. These sanctuaries would cover from three to five thousand acres. Suitable lands ought to be obtained at an average cost not to exceed five dollars an acre. When once established, the ultimate annual cost of maintenance should not exceed \$2,500 to \$3,000 a year.

"The extent to which the Commonwealth should embark upon a program of establishing such sanctuaries bears so closely on the whole question of financing the State's activities that it cannot be considered as standing alone. We estimate that at least a million and a half of our people (who do not hunt or fish) are interested in our wild life and would approve the appropriation of some funds for this purpose. Moreover, we believe that, when the whole project is laid before our wealthier citizens, many of them will be willing to contribute land and funds toward the establishment of sanctuaries. There is evidence of a pronounced awakening of such class to these needs.

"I should not advocate expenditures by the Commonwealth for the establishment of such a group of sanctuaries at one time, or even within a short period of years. Rather I would approve the establishment of one, properly administered, to serve as an example to our people and an inspiration to that class which could well afford to contribute the funds necessary to establish others and endow their maintenance."

"Attached hereto is a memorandum in which I have made an allocation of the sum of \$29,190, for your consideration.

"PART III. MARINE FISHERIES. We have repeatedly urged that more attention should be given to the development of our marine fisheries. They represent our oldest industry. Manufacturing enterprises may be moved away; changing conditions may render other manufacturing plants



obsolete and worthless; but the marine fisheries will always be part and parcel of our industrial life.

"In our communication of November 29, 1926, accompanying the forecast we said:

"For many years the Commonwealth, and rightly, has expended substantial sums annually in the furtherance of agriculture. This money has been provided out of the funds raised by general taxation. In view of the fact that the marine fisheries are equally concerned, with agriculture, in producing a valuable food supply at a reasonable cost, we feel the marine fisheries should be financed out of funds raised by general taxation. One of our wholesale houses has summed up the whole situation as follows:

"We call your attention to the fact that the 'fishermen and the farmers feed the world. The sea and the soil provide our daily food.'

"There is a real demand for the enlargement of our Division of Fish Inspection. Ample facts are available to show that it has been beneficial to the industry itself, and of enormous benefit to the fish consuming public, by reason of an improvement in the quality of fish now being distributed throughout our State as food. There are other items detailed in the budget which should now begin to receive attention."

"The industry has entered on a period of expansion. New methods of catching, preserving and marketing sea products are being adopted. Organization under sane, aggressive leadership is taking place. In other words, this industry is coming and not going. The State should recognize that here is an industry that is localized, tied in with all our traditions, and has enormous potentialities. It can make a strong appeal to consumers in all parts of our country and abroad for its products should be in every home. Not to supply a caprice of appetite but for the reason these products are a necessity in order that all people will have a properly balanced food ration.

"Attached hereto is a memorandum on which I have made an allocation of \$133,269 for your consideration. But even this sum does not begin to cover the field of the State's usefulness to this industry. Just as one illustration I quote from the Fishing Gazette of August, this year:

"It is significant that the Canadian Department of Marine and Fisheries has provided a new wireless broadcasting for the Nova Scotia fishing fleets to be broadcast twice daily and to include: (1) Weather reports; (2) Bait reports from ten ports, showing the quantity of frozen bait in storage, the quantity of fresh unfrozen bait available and ice conditions; (3) Prevailing local prices for dried fish and stock-salted fish, including when possible, Boston and Gloucester quotations; and (4) News items covering catches of vessels arriving from the Grand Banks, outstanding fishing incidents such as loss of life or damage or loss of vessels, or other unusual events of interest to the fishermen, including urgent information as to the families of the fishermen."

"If I can give you any additional data please do not hesitate to call on me.

Very truly yours,

WILLIAM C. ADAMS, *Director.*"

(The enclosures to the foregoing letter, follow.)



## ANALYSIS OF REVENUES AND APPROPRIATIONS

## ADMINISTRATION OF CENTRAL OFFICE, AND THE PROPAGATION AND PROTECTION OF FRESH-WATER FISH AND GAME

1926	Revenue (licenses, fines, etc.) (a)	\$236,031.20
	Appropriation (portion for benefit of anglers and hunters, including money for deer damage) (b)	214,753.10
	Unappropriated	\$21,278.10
1927	Revenue (licenses, fines, etc.) (c)	253,496.30
	Total available for 1927	\$274,774.40
	Appropriation (the portion for the benefit of anglers and hunters including money for deer damage) (d)	229,693.75
	Unappropriated	\$45,080.65
	Unexpended balance of 1926 appropriation (e)	625.56
	Total arrears	\$45,706.21
1928	Revenue (licenses, fines, etc.—partly estimated) (f)	253,677.54
	Total available for 1928	\$299,383.75
	Appropriation (the portion for the benefit of anglers and hunters including money for deer damage) (g)	256,110.51
	Unappropriated	\$43,273.24
	Unexpended balance of 1927 appropriation (h)	1,993.19
	Total arrears	\$45,266.43

*Detail of (a)—Revenue of 1926 analyzed*

	Anglers and hunters	Non-game birds	Marine fisheries	General
Sporting license fees . . . . .	\$225,757.65			
Lobster license fees . . . . .			\$763.30	
Rent at Palmer Hatchery . . . . .	144.00			\$74.95
Sale of game tags . . . . .			85.00	
Sale of launch hull . . . . .				
Sale of gravel . . . . .	10.50			
Lease of Chilmark Pond . . . . .			75.00	
Lease of clam flats . . . . .			65.00	
Permits to take shiners . . . . .	180.00			
Sale of fancy pheasants . . . . .	45.00			
Conscience fund . . . . .	1.00			
Overpayment of town clerks . . . . .	2.85			
Fines . . . . .	9,890.20			
Total revenue, \$237,094.45 . . . . .	\$236,031.20	—	\$988.30	\$74.95

*Detail of (b)—Appropriation for 1926 analyzed*

	Anglers and hunters	Non-game birds	Marine fisheries
Salary of Director . . . . .	\$4,000.00		
Office assistants . . . . .	9,660.00		
Expenses . . . . .	8,000.00		
Exhibitions . . . . .	1,000.00		
Enforcement of Laws:			
Personal services . . . . .	60,500.00		
Expenses . . . . .	24,000.00		
Biologists:			
Personal services . . . . .	4,700.00		
Expenses . . . . .	2,400.00		
Propagation . . . . .	86,000.00		
Fish Inspection:			
Personal Services . . . . .			\$7,860
Expenses . . . . .			2,200
Expenses administering C. 370, Acts 1926, relative to marketing, taking, and transportation of shellfish, etc. . . . .			6,000
Bounty on seals . . . . .			250
Damages by deer and moose . . . . .	6,000.00		
Damages by deer, deficiency (although we do not admit that this is a proper charge against our revenues) . . . . .	3,493.10		
Specials: For improvements and additions at fish hatcheries and game farms . . . . .	5,000.00		
Total appropriation, \$231,063.10 . . . . .	\$214,753.10	—	\$16,310

*Detail of (c)—Revenue of 1927 analyzed*

	Anglers and hunters	Non-game birds	Marine fisheries
Sporting and trapping licenses . . . . .	\$242,432.50		
Lobster license fees . . . . .			\$1,066.75
Rent at Palmer Hatchery . . . . .	180.00		
Sale of game tags . . . . .	39.20		
Permits to take shiners, etc. . . . .	380.00		
Lease of clam flats . . . . .			65.00
Lease of Chilmark Pond . . . . .			75.00
Sale of wagon . . . . .	10.00		
Sale of fox skin . . . . .	10.00		
Sale of bird book . . . . .	5.00		
Sale of forfeited muskrat skins . . . . .	22.50		
Sale of forfeited deer . . . . .	173.10		
Fines . . . . .	10,244.00		
Total revenue, \$254,703.05 . . . . .	\$253,496.30	—	\$1,206.75

*Detail of (d)—Appropriation for 1927 analyzed*

	Anglers and hunters	Non-game birds	Marine fisheries
Director's salary . . . . .	\$4,000.00		
Office assistants . . . . .	10,620.00		
Office expenses . . . . .	7,500.00		
Exhibitions . . . . .	1,000.00		
Enforcement of Laws:			
Personal services . . . . .	62,800.00		
Expenses . . . . .	30,000.00		
Biologists:			
Personal services . . . . .	4,710.00		
Expenses . . . . .	2,400.00		
Fish Inspection:			
Personal services . . . . .			\$9,375
Expenses . . . . .			2,600
Enforcement of shellfish laws:			
Personal services . . . . .			6,750
Expenses . . . . .			3,600
Bounty on seals . . . . .			250
Enforcement of shellfish laws . . . . .			1,000
Expenses, investigation re shellfish . . . . .			1,000

*Detail of (d)—Appropriation for 1927 analyzed—Continued*

	Anglers and hunters	Non-game birds	Marine fisheries
*Propagation	89,663.75*		
Damages by deer and moose (included, but we insist that these claims should not be charged against the revenues from licenses and fines)	9,000.00	\$3,400*	
*Protection of wild life			
Specials: For improvements and additions at fish hatcheries and game farms	8,000.00		
Total appropriation, \$259,005*	\$229,693.75	\$3,400	\$24,575

\* \$350 was used to remove buildings from Egg Rock, and \$2,974.76 to pay part of the total cost of \$4,311.01 for maintaining Martha's Vineyard Heath Hen Reservation, Penikese Island Sanctuary and for a survey of Watic Mountain Sanctuary. The balance of \$1,336.25 for such maintenance was paid out of Propagation. Therefore the original Propagation appropriation of \$91,000 has been reduced by that amount. We claim the total cost of maintaining these two stations should be included in the Non-game Bird part of our appropriation, as their existence is of more benefit to the bird lovers as a class than to the anglers or hunters.

*Detail of (e)—Balances returned unexpended at the close of 1926, from those appropriations which were for the benefit of the anglers and hunters*

Office assistants	\$8.90
Office expenses	69.55
Education and publicity	2.52
Enforcement of Laws:	
Personal services	361.93
Expenses	48.54
Biologists:	
Personal services	56.82
Expenses	17.19
Propagation	60.11
	\$625.56

*Detail of (f)—Revenue of 1928 (estimated) analyzed*

	Anglers and hunters	Non-game birds	Marine fisheries
Sporting licenses:			
Actual to Sept. 1, 1928	\$187,102.65		
September	10,252.00		
October	12,960.00		
November (est.)	32,117.85		
	\$242,432.50		
Fines (est. same as 1927)	10,244.00		
Lobster licenses:			
Actual to Sept. 1, 1928	\$852.55		
September	57.80		
October	9.35		
November (est.)	147.05		
			\$1,066.75
Shiner permits:			
Actual to Sept. 1, 1928	\$110.00		
September	25.00		
October	135.00		
November (est.)	110.00		
	380.00		
Lobster meat permits:			
Actual to Sept. 1, 1928			370.00
Nothing since			
Game tags:			
Actual to Sept. 1, 1928	\$8.85		
September			
October	6.25		
	15.10		
Rent at Palmer Hatchery:			
Actual to Sept. 1, 1928	\$260.00		
September	24.00		
October	24.00		
November (est.)	24.00		
	332.00		
All following are actual to October 31:			
Lease of clam flats			15.00
Sale of muskrat skins	3.00		
Sale of confiscated furs	47.25		
Sale of gun	25.00		
Sale of cow	40.00		
Sale of deer	7.84		
N. E. Fair Association	14.10		
Sale of grass	15.00		
Sale hatching jars	120.00		
Reimbursement for badges	1.75		
Total estimated revenue, \$255,129.29	\$253,677.54	—	\$1,451.75



*Detail of (g)—Appropriation for 1928 analyzed*

	Anglers and hunters	Non-game birds	Marine fisheries
Director's salary . . . . .	\$4,000.00		
Office assistants . . . . .	10,180.00		
Expenses . . . . .	7,500.00		
Publicity . . . . .	1,000.00		
Enforcement of Laws:			
Personal services . . . . .	66,000.00		
Expenses . . . . .	40,000.00		
Biologists:			
Personal services . . . . .	5,100.00		
Expenses . . . . .	2,500.00		
Propagation* . . . . .	98,157.25*		
Inspection of Fish:			
Personal Services . . . . .			\$10,740
Expenses . . . . .			3,300
Enforcement of shellfish laws:			
Personal services . . . . .			9,300
Expenses . . . . .			6,000
Bounty on seals . . . . .			250
Bounty on seals (deficiency of 1927) . . . . .			200
Enforcement of shellfish laws . . . . .			1,000
Purchase of lobsters . . . . .			7,500
Bounty on seals (in addition) . . . . .			350
†Damages by wild deer and moose . . . . .	9,000.00†		
†Damages by wild deer (1927 deficiency) . . . . .	2,673.26†		
*Protection of wild life . . . . .		\$3,400*	
Specials: For improvements and additions at fish hatcheries and game farms . . . . .	10,000.00		
Total appropriation, \$298,150.51 . . . . .	\$256,110.51	\$3,400	\$38,640

\* \$3,393.55 was used to pay part of the total cost of \$4,936.30 for maintaining the Martha's Vineyard Heath Hen Reservation and Penikese Island. The balance of \$1,542.75 for such maintenance was paid out of Propagation. Therefore the original Propagation appropriation of \$99,700 has been reduced by that amount. We claim the total cost of maintaining these two stations should be included in the Non-game Bird part of our appropriation, and their existence is of more benefit to the bird lovers as a class than to the anglers or hunters.

† Included, but under the same protest as in 1927, that these damages should not be charged to revenue from licenses and fines.

*Detail of (h)—Balances returned unexpended at the close of 1927, from those appropriations which were for the benefit of the anglers and hunters*

Office assistants . . . . .	\$683.23
Office expenses . . . . .	61.92
Education and publicity . . . . .	4.45
Enforcement of Laws:	
Personal services . . . . .	606.17
Expenses . . . . .	44.32
Biologists:	
Personal services . . . . .	120.00
Expenses . . . . .	41.04
Damages by wild deer and moose . . . . .	.59
Propagation . . . . .	431.47
	\$1,993.19

ALLOCATION

PART I — ADMINISTRATION OF CENTRAL OFFICE, AND THE PROPAGATION AND PROTECTION OF FRESH-WATER FISH AND GAME

	Appropriated for 1928	Suggested appropriation for 1929
Salary of Director (Item 263)	\$4,000.00	\$4,550
Office assistants (Item 264)	10,180.00	10,310
Office expenses (Item 265)	7,500.00	8,891
Publicity (Item 266)	1,000.00	1,000
Inland Law Enforcement:		
Salaries (Item 267)	66,000.00	70,000
Expenses (Item 268)	40,000.00	50,000
Biologists:		
Salaries (Item 269)	5,100.00	6,540
Expenses (Item 270)	2,500.00	2,700
Propagation of game birds, etc. (Item 271)	99,700.00	106,000
Damages by deer and moose (Item 272, and deficiency appropriation)	11,673.26	9,000
Specials: For improvements and additions at fish hatcheries and game farms (Item 279)	10,000.00	30,000*
	\$257,653.26	\$298,991

\* As indicating the great need of this amount for "Specials"—the following are listed from the Forecast. The enlargement of rearing space at our game farms is imperative.

Lands now held under lease with options of purchase in the leases are as follows. These are all parts of our plants and cannot be abandoned. We are paying annual rentals of from six to ten per cent of the purchase price.

Ayer Game Farm	\$5,000
Merrill <i>et als.</i>	1,600
George H. Thompson	600
Town of Sutton	810
Welsh family	865
Grace E. Sullivan	360
	\$9,235
Other items of immediate necessity:	
Montague Fish Hatchery:	
Complete house for superintendent	3,500
Ayer Game Farm:	
Garage	900
Brooder houses, pens and yards	3,000
Wilbraham Game Farm:	
Brooder houses, pens and yards	2,000
Marshfield Game Farm:	
Incubator house and grain room	3,000
Brooder houses, pens and yards	2,000
Purchase of camp	800
East Sandwich Game Farm:	
Brooder houses, pens and yards for pheasants	2,000
Brooder houses, pens and yards for quail	1,500
Merrill Pond System:	
(Which includes Stockwell Ponds, Sutton-Thompson Ponds and Welsh-Sullivan Ponds)	
Construction and completion of dams	3,000
Amherst Rearing Station:	
House for superintendent	7,500
(Present house to be occupied by an assistant)	
Meat house, ice house and work shop	2,000
Palmer Fish Hatchery:	
Replace wooden dams with concrete	1,000
Concrete raceways in bass ponds	350
Additional bass ponds	1,000
Sandwich Fish Hatchery:	
Additional trout ponds	1,000
	\$43,785

## ALLOCATION

PART II—NON-GAME BIRD RESERVATIONS AND WILD LIFE SANCTUARIES  
(Item 273 of the Budget, "Protection of Wild Life")

	Appropriated for 1928	Suggested appropriation for 1929
MAINTENANCE		
Martha's Vineyard Heath Hen Reservation:		
Salary of superintendent . . . . .		\$1,500
Extra labor . . . . .		50
General operating expenses . . . . .		750
Replacing superintendent's car . . . . .		650
	\$3,400	
Penikese Island Sanctuary:		
Salary of superintendent . . . . .		1,290
General operating expenses . . . . .		500
Boxford Sanctuary:		
Special patrol . . . . .	Nothing	600
Edward Howe Forbush Wild Life Reservation:		
Special patrol . . . . .	Nothing	600
Isaac Sprague Bird Sanctuary:		
Special patrol . . . . .	Nothing	600
Minns Wild Life Sanctuary (Little Wachusett Mountain):		
Special patrol . . . . .	Nothing	600
Watatic Mountain Wild Life Sanctuary:		
Special patrol . . . . .	Nothing	600
SPECIALS: CONSTRUCTION AT NON-GAME BIRD RESERVATIONS AND WILD LIFE SANCTUARIES (Item 279 of the Budget.)		
Boxford Sanctuary		
Permanent wooden signs . . . . .	Nothing	\$100
Edward Howe Forbush Wild Life Reservation:		
Permanent wooden signs . . . . .	Nothing	100
Isaac Sprague Bird Sanctuary:		
Removal of buildings . . . . .		500
Construction of dam to build fresh-water pond . . . . .	Nothing	1,500
Knight Wild Life Reservation:		
Permanent wooden signs . . . . .	Nothing	100
Martha's Vineyard Heath Hen Reservation:		
Repairs to superintendent's house . . . . .	Nothing	200
Fix foundation to, and repair barn . . . . .		250
Porch to superintendent's house . . . . .		150
Minns Wild Life Sanctuary (Little Wachusett Mountain):		
Permanent wooden signs . . . . .	Nothing	100
Penikese Island Sanctuary:		
Repairs to superintendent's house . . . . .		\$150
Complete removal of buildings . . . . .		500
Pond—fresh water for wild fowl . . . . .	Nothing	500
Watatic Mountain Wild Life Sanctuary:		
Permanent wooden signs . . . . .	Nothing	100
Wiring off and marking trails . . . . .		200



ALLOCATION — PART II — *Continued*

	Appropriated for 1928	Suggested appropriation for 1929
Wild Life Sanctuary at East Sandwich:		
Construction of road into sanctuary from State highway, including widening dike, and culvert . . . . .	Nothing	\$500
Construction of dam to form large fresh-water pond for waterfowl . . . . .		1,500
Purchase of land for permanent wild life sanctuaries . . . . .	Nothing	15,000
	\$3,400	\$29,190

## ALLOCATION

## PART III — MARINE FISHERIES

	Appropriated for 1928	Suggested appropriation for 1929
Regulating the Sale and Cold Storage of Fresh Food Fish:		
Salaries (Item 274) . . . . .	\$10,740	\$11,820
Expenses (Item 275) . . . . .	3,300	5,360
Coastal Warden Service:		
Salaries (Item 276) . . . . .	9,300	14,700
Expenses (Item 277) . . . . .	7,000	19,820
Purchase of egg-bearing lobsters (Item 278-a)	7,500	10,000
General lobster work:		
Inspection of international shipments . . . . .	Nothing	1,385
Repairs to equipment (including replac- ing lobster ear, new shipping barrels and locks) . . . . .	Nothing	150
Collection and planting of short lobsters from international shipments . . . . .	Nothing	350
Lease of store room, and coal . . . . .	Nothing	94
Salt-Water Smelt Work:		
Lease and purchase of lands to control spawning grounds . . . . .	Nothing	2,500
Alewife work:		
Transplanting of alewives . . . . .	Nothing	200
Maintenance of Lawrence fishway . . . . .	Nothing	300
Observations at fishways . . . . .	Nothing	840
Seals—bounty (Item 280 and deficiency ap- propriation) . . . . .	\$450	1,000
Shellfish:		
Co-operate with U. S. Bureau of Fish- eries in studying the growth of all shell fish, methods of collecting seed, and the replanting of all suitable areas . . . . .	Nothing	10,000
Collecting and returning to the water stranded scallops . . . . .	Nothing	1,000

ALLOCATION — PART III — *Continued*

	Appropriated for 1928	Suggested appropriation for 1929
Re-seeding grounds open to public fishing	Nothing	\$1,000
Commercial Fisheries Laboratories:		
Salaries	Nothing	13,750
Expenses	Nothing	29,000
For directing public attention to the value of eating Sea Products	Nothing	10,000
	\$38,290	\$133,269

On November 23 a statement was sent to all the local organizations, enclosing that portion of the foregoing letter which shows the total arrears, and also outlining our suggestion for the allocation of the \$299,000 asked.

## CONFERENCES WITHIN THE STATE

The regular annual conference with the anglers, hunters and those interested generally in wild life, was held at the State House on January 11. All parts of the State were represented. The recommendations for legislation to be filed by the Division were, as usual, fully discussed, and in addition many other matters of general interest relating to the conservation of wild life and the betterment of sport.

The second such conference was held on November 27, and was, in reality, to cover the legislation of the year 1929. This resulted in the holding of two conferences in one year. The reason for this was the adoption by the Director of a new plan for the handling of legislation. For several years past it has been the Director's practice to send the local organizations a list of measures upon which legislation was most urgently needed, giving his reasons for such needs in each case. The statement was accompanied by a questionnaire on which the associations were asked to register their majority sentiment for or against each proposed measure. The Director gave assurance that he would file no measure which the majority of the clubs answering did not favor.

That plan put on the Director the responsibility of being the moving agency in furthering these matters through the Legislature. Experience has shown that he should not assume the responsibility of advocating important legislation. The Director sits in an advisory capacity to the Legislature; he cannot ask its members to vote for his recommendations; and at all times he must be free from any obligations to members of the Legislature or the public at large in administering the Division. Therefore, this year he sent to local organizations a letter dealing with five major propositions upon which he felt action should be taken, namely, (1) to increase license fees; (2) to authorize the Director to appoint agents (in addition to the city and town clerks) who will issue sporting and trapping licenses without charge; (3) to prohibit all fishing through the ice in January and February; (4) to reduce the open season on cottontails and white hares to two months; and (5) to restore the public rights in natural great ponds between ten and twenty acres.

In order that these and other important questions should be fully discussed well in advance of the expiration of the time within which to file bills, the Director set the annual conference to cover the legislative session of 1929 on the above date. By this plan the local organizations and

the public at large can be most fully informed of the workings of the Division, and be best equipped to perfect any larger organization that may be desirable to further these projects.

#### ACTIVITIES OUTSIDE THE STATE

The Director attended meetings having to do with all phases of wild life conservation, as follows:

The annual meeting in New York City of the National Game Conference on December 5 and 6, 1927. As usual the general subject-matter of the discussions related to the artificial propagation of game birds and quadrupeds throughout the country.

The annual meeting December 8, in Washington, of the Advisory Board to the United States Biological Survey relative to regulations proposed by the Bureau of Biological Surveys affecting wild fowl. The Director is a member of this Board.

The annual meeting of the United States Fisheries Association in Buffalo, N. Y. August 1-4.

#### ACKNOWLEDGMENTS

Such contributions as have been received during the year are accounted for under the following funds:

##### *Stockwell Ponds Fund*

The balance of \$16.80 carried over from the previous year was expended in completing the large dam in Middle Pond.

During the year further contributions for this work were received, as follows:

Worcester County Fish and Game Association . . . . .	\$42.20
Norwood Sportsman's Association . . . . .	10.00
Athol Rod and Gun Club . . . . .	50.00
Woodville Rod and Gun Club . . . . .	10.00

\$112.20

Of this sum \$48 has been used on further work on the above dam in Middle Pond, leaving \$64.20 on hand at the close of the year.

##### *Amherst Rearing Station Fund*

Of the balance of \$1,050 on hand at the close of the last fiscal year, \$1,000 was used to purchase the Bartlett-Whitcomb tract.

During the year additional contributions were received, as follows:

Springfield Fish and Game Association . . . . .	\$100.00
He Man's Club—of Granby . . . . .	5.00

The foregoing contributions of \$105, together with the remaining \$50 from the previous year, were used, together with a part of our appropriation, to complete the purchase of the Clark property.

##### *Palmer Fish Hatchery Fund*

The Camp Cook Club of Ware contributed \$25 for work at the Palmer Hatchery. It was used to open up brooks which are part of the water supply, so as to increase the volume.

##### *Montague Fish Hatchery Fund*

The balance of \$153.98 on hand at the close of the last fiscal year, was used to clear out the remaining stumps on the area to be devoted to the construction of large rearing pools, and part of the cost of dynamiting a new bed for the brook in order to move it to one side of its former location, and off the area to be used for ponds.



On September 14 we received from the Franklin County League of Sportsmen's Clubs a further contribution of \$550 for the construction of the large rearing pools referred to above. Up to the close of the fiscal year \$419.75 had been used for the purpose, and there remains on hand a balance of \$130.25.

### *Gifts of Land*

The public continues its interest in the principle of permanent wild life sanctuaries, which has been discussed in previous reports. During the year the following gift of land, to be a permanent wild life sanctuary, was received:

From the Federation of the Bird Clubs of New England, Inc., approximately 5,000 acres of land located in the town of Hancock, to be known as the Edward Howe Forbush Wild Life Reservation. (See Sanctuaries.)

### *Other Gifts*

The balance of \$1.20 of the funds contributed by the Federation of the Bird Clubs of New England, Inc., and Isaac Sprague, Esq. for the removal of buildings from Carr Island, remains unexpended.

The balance of \$38.42 of the fund raised by the North Shore Rod and Gun Club (including contributions from Ralph S. Bauer, Esq. of Lynn and from the Massachusetts Fish and Game Association) to pay the cost of salvaging fish from Wenham Lake, remains unexpended.

The Town of Falmouth, as its contribution to the improvement of fishing conditions in that locality, paid bills amounting to \$75 for the transfer of fish by one of our salvage units from Long Pond, Falmouth, to local waters open to public fishing.

The Town of Webster helped advance the work at the Thompson and Putnam Mill Dams by paying bills to the amount of \$100 (\$36 for the former and \$64 for the latter).

## **ENFORCEMENT OF LAW**

Among the many changes in the personnel of the law-enforcement force which must be recorded this year is the loss by death of two faithful wardens. On December 3, 1927, Warden Patrick F. McCarthy of Easthampton was overcome while fighting a fire in his town and died immediately from the effects. Warden McCarthy was a member of the Board of Fire Engineers of the town and went into a burning building with his men, where the effects of escaping gas resulted in his untimely death. He was a veteran of the Spanish American War, served as fish and game warden since 1912 and was held in high respect by his superior officers and by residents of his district.

On March 27, 1928, Warden Arthur M. Nichols of North Adams, one of the oldest wardens in this Division in point of service, died suddenly from a heart attack. Warden Nichols served the Commonwealth for twenty-eight years as warden and was highly respected by his superior officers and the residents in his district.

Because of the increased amount of work and to promote greater efficiency in the warden service, Warden Frederick W. Goodwin of East Boston was relieved from duty in the Boston district and assigned as a Field Supervisor of the warden force. Warden Goodwin's work consists of co-operating with the various wardens in their own districts and organizing and supervising special enforcement work where it is necessary to bring several wardens together for effective operations.

Warden Elisha T. Ellis of North Easton, who had been a warden for eleven years, resigned on March 15, 1928, to accept an appointment as

Chief of Police of the town of Easton. Mr. Leon E. Myatt of Attleboro, who had served many years as an unpaid deputy, was appointed to succeed him.

On April 1, 1928, Warden Edward E. Backus of Ayer was promoted to the position of Superintendent of the Ayer Game Farm. Mr. Lloyd M. Walker of Maynard, who served as fish and game warden for that town, was selected to succeed Warden Backus in the Ayer district.

Under authorization received from the Legislature two additional wardens were added to the inland warden force in the persons of Mr. Oscar L. Cregan of West Brookfield and Mr. Arthur J. Loveley, Jr. of Lancaster. Warden Cregan has been assigned to the district around North Grafton. Warden Loveley has not yet been assigned to a district and is engaged in special law-enforcement work. Both men formerly served as deputy wardens.

One change in the coastal warden service was made through the resignation of Warden Ernest C. Cloon of Lynn to accept a position as Food Inspector in the Department of Public Health. Mr. Henry M. Parlee of Lowell, who served for many years as a deputy warden, was appointed to the coastal warden force in his place.

Authorization was received from the Legislature to add two permanent wardens to the coastal warden force, and this was done by the appointment of Deputy Wardens Stephen W. Jenkins of Danvers and Holger G. Smith of Bridgewater to the permanent coastal warden force. These men were assigned to the enforcement of the shellfish laws in and around Boston Harbor.

The law-enforcement work proceeded during the year with little, if any, variation from past years. While the court record for the year is practically the same as for the previous year, yet it is fair to say that the law-enforcement work was carried on more vigorously than in the past. The lack of a greater number of cases is due largely to the fact that there were several changes in personnel in the force during the year, and, as may be expected, it has taken the new wardens some little time to become acquainted in their districts.

The warden force is now equipped with a first-class motor vehicle fleet, as twenty-two cars were purchased during the year. This gives each man a car with which to operate through his district. In addition to this a large percentage of the force has been equipped with trailers, boats and outboard motors, increasing their efficiency for patrol work both on the coastal and inland waterways.

The law provides that each city and town may request the appointment of a local fish and game warden, yet only fifty cities and towns throughout the Commonwealth took advantage of this law throughout the year. This is one way in which the cities and towns can aid in the enforcement of the fish and game laws in their localities, but this form of co-operation has been noticeably lacking.

While there was a lack of requests for the appointment of town and city fish and game wardens there were many applications for appointment as unpaid deputy wardens, and approximately 250 men served in this capacity during the year. Some of the deputies have done splendid work during the year, but the percentage of such was extremely low, and as a whole the record of this volunteer force is far from satisfactory.

The court work for the year was as follows: Number of cases, 1,271; convicted, 1,179; discharged, 92; (filed, 168, appealed, 75); fines imposed, \$15,594. In addition to the penalty imposed by the courts, each person convicted loses any sporting license or trapping license which may have been issued to him, together with his right to secure a license within one year following date of conviction. Licenses revoked: resident citizen sporting, 274; non-resident sporting, 1; resident trapping, 53; alien trapping, 2; alien sporting, 7; minor trapping, 5; resident lobsterman, 2; alien lobsterman, 1; total, 345.



The fact that of the 1,271 cases prosecuted, only 92 were discharged, indicates that only bona fide cases were brought to court, and that in practically every instance the wardens had sufficient evidence to convict. Of the cases where convictions were secured 168 cases were placed on file, but that disposition indicated that there was justifiable cause for bringing the defendants to court. A total of \$15,594 was assessed in fines against these violators, but the total amount of money which was paid into the treasury of the Commonwealth as a result of fish and game cases was substantially less than this figure, due to the fact that a number of these cases are still pending on appeal in the Superior Court, and further because in some cases where an appeal was taken, the smaller fine was imposed when the case was finally settled in the Superior Court. The above figures refer to the amount of money assessed upon convictions in the district courts throughout the State.

Outnumbering all other classes of violations is that of fishing in inland waters without a sporting license. During the year many of these violators were apprehended and prosecuted. This form of violation continues from year to year, despite the efforts of the wardens to stop it through continuous prosecutions. The general public does not seem to realize the requirements of the law in this respect, nor does it realize that the maintenance of the inland fisheries of the State depends on the amount of revenue obtained from sporting licenses. The major portion of the money expended for propagation work is devoted to the operation of fish hatcheries, and the scope of that work is dependent upon license fees. A sporting license is required today on practically every inland fishing water, and prosecutions will continue without fear or favor until the public realizes that sporting licenses must be purchased before these waters may be fished.

The offence of hunting without a sporting license is also a serious consideration, although the number of these violations does not compare with those mentioned above. While 103 persons were prosecuted for hunting without a license, a total of 264 were prosecuted for fishing without a license, indicating that there is a much greater tendency to ignore the law requiring a license to fish in stocked waters.

The next important class of violations was those having to do with the taking of shellfish on the contaminated coastal areas, and during the year 171 persons were prosecuted for thus taking shellfish, and fines totalling \$2,425 were assessed against them. As far as the limited coastal force (which comprised only 5 wardens up to October 15, when 2 additional men were appointed) was able to do, much effort was made to stop the public from digging on these areas.

Much of the time of the wardens, particularly those in the western part of the State, was taken up with the work of the appraisal of deer damage claims which has become one of the functions of this Division. On September 5 a new law became effective relative to the appraisal of these claims, and at that time a change was made in the system of appraising claims as far as the warden force was concerned. In the future one warden will handle all of the deer claims in his county. By centralizing this work in one man in each county, he will naturally become more efficient in handling it.

While some taking of shellfish on the contaminated areas continues in certain parts of the State, particularly in the vicinity of Boston and Lynn Harbors, there was an improvement throughout the State in the observance of this law.

The members of the coastal warden force have devoted much time in co-operating with the State Department of Public Health in its experimental work on the transplanting of shellfish from the contaminated areas into clean waters where they are allowed to purge themselves. The major part of this work was carried on in the vicinity of New Bedford and Fairhaven, where the district coastal warden had fifteen special deputies under his supervision to see that the regulations of the State Department of Public Health concerning this experimental work were adhered to.

On July 25 a law became effective under the terms of which the Director was authorized to purchase egg-bearing lobsters from the fishermen. This



work was handled by the coastal warden force with the co-operation of several prominent lobster dealers throughout the State, who willingly assumed the task of purchasing these lobsters from the fishermen out of their own funds. The coastal wardens collected and marked these lobsters by punching a hole in the middle flapper of the tail, and liberated them in the localities where they were originally taken.

#### NEW LEGISLATION

The following changes were made in the fish and game laws during 1928: Chapter 8, Acts of 1928, amends section 35 of chapter 130 of the General Laws and restricts the use of more than ten hooks in any inland water. Previously the law applied only to ponds.

Chapter 20 amends section 26 of chapter 131 and penalizes the possession as well as the killing of the birds mentioned.

Chapter 21 amends section 105 of chapter 131 relative to the revocation of lobster licenses, and provides that a lobster license shall be revoked for a second conviction for violation of any fish and game law within a period of three years. Heretofore a license was revoked only for certain specified violations of the lobster laws.

Chapter 24 amends section 57 of chapter 131 and penalizes the netting or snaring of any birds, whether protected by law or not. The previous law covered only protected birds.

Chapter 35 is a special law relative to the use of trawls in certain sections of Buzzard's Bay.

Chapter 40 relates to the enforcement of the fish inspection law and makes a few minor changes to improve its enforcement.

Chapter 72 increases the penalty for the illegal killing of quail, making a minimum of \$20 and a maximum of \$50.

Chapter 74 amends the law relative to the special restrictions on the Deerfield River, extending them to the entire river where heretofore they applied only to the section from Shelburne Falls to the State line.

Chapter 113 amends section 80 of chapter 130 and provides that no person may take scallops by hand for his own family use unless he has a permit from the local authorities to do so.

Chapter 131 amends section 98 of chapter 130 relative to the issuance of permits for the sale of lobster meat and provides for a fee of \$10 for such permits.

Chapter 170 amends section 7 of chapter 21 and increases the maximum salary for the town fish and game wardens from \$100 to \$200.

Chapter 177 extends for two years a closed season on quail in Essex, Hampden, Hampshire, Middlesex, Nantucket, Norfolk and Worcester counties.

Chapter 178 provides a closed season on ruffed grouse during 1928.

Chapter 215 amends the law relative to the open season on deer, providing for an open season of two weeks instead of one. The bag limit and other restrictions remain the same.

Chapter 220 amends section 58 of chapter 131 by providing a penalty for the possession of furs which have been taken by the use of poison.

Chapter 263 provides for the purchase of egg-bearing lobsters by the Director, and increases the lobster license fee to \$5.00. The new license fee becomes effective January 1, 1929.

Chapter 266 amends section 138 of chapter 130 and includes the word "digs" in addition to the taking of shellfish from the contaminated areas. This is to meet the objection of some courts which held that the digging of shellfish was not a violation of the previous law unless the shellfish were transported from the area.

Chapter 269 is a new law relative to the transportation of shellfish.

Chapter 271 repeals section 39 of chapter 131 and provides that the Commissioner of Conservation may establish the open season and regulations on shore birds, rails, jacksnipe, coots and gallinules.

Chapter 323 is a new law under which cities and towns may operate plants

for the purification of shellfish taken from the contaminated areas under the general supervision of the Department of Public Health and this Division.

Chapter 361 amends section 67 of chapter 131 and devises a new system for the appraisal of deer damage claims. All claims over \$20 will be appraised by three men, one appointed by the owner, one by the county agricultural trustees, and, the third by the Director of this Division. Claims under \$20 will be appraised by the chairman of selectmen as at present.

Chapter 17 of the Resolves provides for an investigation as to the advisability of establishing a fish rearing station in Essex County.

Chapter 44 of the Resolves provides for the appointment of a special unpaid commission of seven persons to investigate the entire shellfish situation and industry.

#### RECOMMENDATIONS FOR NEW LEGISLATION

Recommendations to the general court of 1929 for changes in the fish and game laws will be found at the end of this report.

#### EDUCATION AND PUBLICITY

We are fully alive to the benefits resulting from a systematic campaign of informing our people on the theory and practice of wild life conservation, but the pressure of work has made it impossible to accept many invitations to appear before local organizations to discuss these problems. There are now some 250 local fish and game clubs. It is impossible to attend all of the annual meetings of these organizations, let alone cover the many requests from other groups. However, during the past year, by a rearrangement of the law enforcement work, Chief Warden Bourne covered a larger number of assignments than has been possible for some years past.

The exhibit at the Eastern States exposition in West Springfield has become an annual affair, and this year was set up along the usual lines. Exhibits were also made at the Franklin County Agricultural Society's fair at Greenfield, at the fair of the Worcester Agricultural Society at Worcester, and several pens of pheasants shown at the exhibit of the Brockton Agricultural Society at the Brockton Fair.

Through releases to the press and special articles we continue to keep the public informed of the work in general. There were also distributed some 10,000 reprints of an article published in the *Boston Transcript*, explaining to the fishermen and hunters how the law works with regard to fishing rights, and our method of fish and game distribution.

#### BIOLOGICAL DEPARTMENT

##### FIELD WORK

Little that is new can be said concerning fishways. With one or two exceptions all of the important coastal streams are now open to the sea.

Adult alewives were collected from two of the more flourishing fishways and used to restock old breeding grounds.

A considerable amount of time was given to inspecting the pheasant pens and rearing pools in which the local sportsmen's associations and chapters of the Izaak Walton League of America are rearing State birds and fish.

Frequent visits were made during the breeding and rearing seasons to the game farms and fish hatcheries to inspect the stock and arrange for discarding brood stock, and adding new blood for improving the following year's production.

##### DISTRIBUTION

The annual movement of the large stock of fish and birds produced at the fish hatcheries and game farms involves a great amount of detail and requires a large amount of the time of the biological department. Not only must this stock be moved, but it must be apportioned equally over the entire State to the sections which have been found, after careful investigation, to have the proper waters and cover. In addition to this, there is a large amount of work in entering on the office records the details of its liberation and planting.



Special consideration is still being given to the stocking of all natural great ponds of twenty acres or over. At the close of this year, all ponds within this category have received plantings of fish.

Special groups of white perch and small mouth black bass ponds are still being selected annually for stocking.

A large number of private ponds were stocked after the receipt of a written agreement from the owners or controllers of the water rights.

Several ponds were stocked and closed to winter fishing, and a breeding area was set aside in one of the larger of the great ponds in the State. (See Inland Fisheries—Ponds.)

Additional clerical assistance supplemented the office force in collecting information on all the inland waters of the State. These can roughly be classified into (a) natural great ponds of 20 acres and upwards; (b) natural great ponds between 10 and 20 acres; (c) reservoirs and natural great ponds which are used as municipal water supplies; (d) privately owned ponds; and (e) streams and rivers.

The information that has been collected in other departments on these waters was consolidated with our own records, and we are now engaged in classifying this material. In this connection we should point out that the status of many waters still remains to be determined. In some instances natural great ponds of twenty acres and upwards have been greatly enlarged through the construction of dams and by flowage. In many instances it still remains to be determined whether such waters are natural great ponds though increased by flowage, or whether they are merely artificial reservoirs. Much work still remains to be done to complete the biological survey of all State-owned ponds of 20 acres and upwards.

#### FISH AND BIRD DISEASES

In addition to the many routine pathological examinations of diseased fish and birds received from time to time for autopsy, any abnormal conditions discovered among the stock at the stations or in the field were studied and treated.

In August an epidemic of coccidiosis attacked the young pheasants at the Wilbraham Game Farm, for details of which see the station report.

#### WILD BIRDS AND ANIMALS

##### WINTER FEEDING

Owing to the open winter practically no feed was distributed for feeding the wild stock.

##### BREEDING SEASON

The breeding season was cold, with wet weather, continuing late. Taken as a whole it was unfavorable.

##### FIRES

The absence of drouth conditions made it unnecessary to consider closing either the trout fishing season or the hunting season.

##### POSTED LAND

The total volume of posted land has remained about the same in recent years. In a given year a substantial area may be posted in some one town. This movement usually wears out in time, with a similar activity arising somewhere else. Our land owners continue their democratic attitude of permitting the public to hunt and fish over their properties—a condition which is becoming more and more appreciated by our hunters and fishermen. In this connection we are renewing our request of last year for more authority to our wardens, so that they may give increasing protection to the land owners.

##### MIGRATORY BIRDS

##### *Song and Insectivorous Birds*

There was little increase in the number of permits now outstanding for the collection of birds, eggs and nests for scientific purposes. Seventy-seven



permits were issued. On the basis of the reports (of which 73 were received) 183 birds and 468 eggs were taken.

Our wardens have apprehended a number of violators in the act of destroying eggs or the birds of those species. We will continue our efforts to give them increasing protection.

### *Migratory Game Birds*

*Shore Birds.*—The Federal regulations continue a close season on all species of shore birds. Owing to the absence of gunning it is natural that the birds will proceed more leisurely on their summer and fall migrations. It is quite usual for them to linger in a favorable area if not driven out by hunters. As a result it is unwise to draw too hasty a conclusion that there has been a substantial increase by reason of the larger numbers seen; but, taken as a whole, it is safe to say that these birds are showing a gradual increase.

*Plover.*—Both the spring and the fall migration indicated an increase in the black breast plover. In several localities a larger number than usual of golden plovers was reported. The upland plover is not more than holding its own, and only a few breeding pairs are found in any one locality. The piping plover breeds on limited areas, and its status remains unchanged.

*Snipe.*—The spring migration was usual. The fall migration brought in more than the average numbers of birds. In some parts of both the North Shore and the South Shore and in the low lands along some of our rivers, better shooting than usual was afforded.

*Woodcock.*—More than the usual number of breeding birds was reported during the early spring and breeding season. It is remarkable how these birds adjust themselves to the cold, wet, unfavorable conditions of the average breeding season.

The fall flight was heavier than has been known for many years, and it was quite generally spread out over the entire State. While the season opens on October 20 and there are few observers in the covers prior to that date, the indications are that the flight arrived this year at about the time of the opening of the season and was particularly heavy during the first three days, although in some localities the birds were reported numerous as late as the early part of November.

*Rails.*—The season on rails was changed to open at the same time as the duck season, thereby eliminating the excuse for rail hunters to be on the duck grounds before the opening of the duck season. Rails continue to hold their own, and more were reported in various places than usual.

*Sandpipers.*—These birds continue to show an increase.

*Winter and Summer Yellowlegs.*—There was a good spring flight of both species. The summer and fall migrations were much heavier than has been the case for several years.

*Curlew.*—There is an increase in this species, although it is proceeding slowly.

*Ducks.*—More than the usual number of wood ducks were reported in the localities which are still favorable for them. These are the wooded areas in the swamps along some of our larger sluggish streams.

Mallard, teal, pin tail and canvas back ducks are reported annually, but do not make up a large percentage of the ducks taken.

The spring and fall flights of red heads and blue bills continues sub-normal, based on the observations of recent years.

The black duck registered a slight increase; but this is relatively small as compared to what could be the case were there an adequate number of proper wild life sanctuaries scattered along our coast and at various points inland.

*Geese.*—From December 1, 1927, to the close of the season the movement showed an increase over the preceding year.

The spring flight was without special incident.

The fall flight started early, and up to the close of this report (November 30) the geese were moving along in good numbers. The steady, warm, blue-

bird weather of the average fall was present until the latter part of November, when several quick changes in the weather started the birds along.

The spring flight of brant was without incident. In October there were several days when they flew in large numbers, but the rather steady flight of previous years had not taken place up to the close of this report. However, the birds had moved along sufficiently to provide some sport in the special brant areas (such as the waters off Monomoy and in the regions around Tuckernuck and Muskeget).

*Statistics of the Gunning Stands.*—Number of stands which reported, 124; geese shot, 3,839; ducks shot, 10,660; live goose decoys used, 5,091; wooden goose decoys used, 3,816; live duck decoys used, 3,777; wooden duck decoys used, 2,932.

#### *Migratory non-game Birds—Gulls and Terns*

The gulls and terns bred on about schedule time in the spring and had to run the course of another unfavorable breeding season. But these species, taken as a whole, appear to be holding their own and in some localities are registering an increase. The additional consideration that these birds are now receiving through the maintenance of several sanctuaries is beginning to show results.

#### *Federal Control of Migratory Birds*

The Migratory Bird Bill, which has been before the Congress of the United States for some years, was finally passed by the Senate at the last session. It was so altered and amended as to leave little of the original bill. It now becomes known as the Migratory Bird Conservation Act (popularly known as the "Norbeck Bill" in honor of Senator Peter Norbeck of South Dakota, who for several years has given it his undivided attention and oversight in the Senate.) The provisions for establishing public hunting grounds and for financing the measure by a Federal hunting license, have been eliminated. In its present form it is a straight bill asking for an annual appropriation of a million dollars to establish inviolate sanctuaries.

At the annual meeting of the International Association of Game, Fish and Conservation Commissioners, the bill was very fully discussed, and a committee, national in its scope, was selected to father the bill at the next session of Congress. There has been a decided tendency on the part of factions interested in this legislation to submerge their individual differences of opinion and get together on the present measure, with some modifications which can undoubtedly be worked out on a give-and-take basis. It appears now that there is more likelihood of making a start on the establishment of large sanctuaries for the maintenance of breeding and wintering areas, than has been the prospect in some years.

### UPLAND GAME

#### *The Hunting Season*

The arrival of timely rains removed any necessity for considering the closing of the hunting season on account of drouth. From the opening day, October 20, up to within a few days of the close on November 20, the weather continued warm with little rainfall. While the days were pleasant, as a rule they were too warm for either the hunter or his dogs. However, very few days out of this short season were a total loss because of weather conditions.

*Pheasants.*—Before the opening of the season pheasants were reported in substantial numbers over most of that portion of the State which can be fairly considered pheasant country. The pheasant will not stay in the heavily timbered sections, preferring the open country where it can have upland for feed and range, and swamps for roosting and retreat. But with the arrival of the shooting season the birds seemed, in the opinion of the average hunter, to fade away. This may be due to the fact that by reason of our long open season, these birds have learned to get out of the way in short order. At any rate, the average hunter does not have the advantage of a good dog and is reluctant to go into the heavy swamps where the larger numbers



of pheasants are found. Every year we receive reports of a scarcity in certain localities during the shooting season, only to have them reported in numbers after the season closes and things quiet down.

The fact remains, however, that if we are going to increase sporting opportunities with this bird we must increase its numbers.. The average hunter who pays \$2.25 for a license does not realize that if he kills but one cock pheasant in a season it would cost him twice the amount he pays for his license to put that bird back into the covers alive. There are over 120,000 purchasers of sporting licenses. If we assume that half of them hunt, and if this half killed but one cock pheasant each in a season, it would require 60,000 birds to go around. This should give the rank and file of our hunters some appreciation of the problem of supplying an adequate number of game birds of any species to provide even a modicum of sport.

The total number of pheasants reported shot in open season was 1,914, divided according to counties as follows: Barnstable, 23; Berkshire, 38; Bristol, 145; Essex, 270; Franklin, 73; Hampden, 199; Hampshire, 157; Middlesex, 344; Norfolk, 154; Plymouth, 180; Worcester, 331.

*Ruffed Grouse.*—In our last report (ending November 30, 1927) we could discuss the status of the grouse only as based on the breeding season and the reports from hunters in the open season and for the ten-day period following it. We stated that an alarming scarcity of these birds was reported from all sections of the State. During the late fall and early winter we canvassed the situation closely and concluded that the only safe course was to ask for a close season this fall. It is to the great credit of our sportsmen that they were practically unanimous in agreeing to this plan. The bill was enacted and the grouse were given a year's protection.

The breeding season was not favorable and the numbers of birds reported in the fall confirmed the wisdom of giving them a respite this year. However, reports from hunters in various parts of the State indicate that a good breeding stock was carried over in many localities. We hope that history will repeat itself and that the birds will regain their normal numbers as rapidly as was the case after the closed season of 1919.

The New England Ruffed Grouse Investigating Committee continues its work. More data has been added to that previously collected, and while there were no outstanding discoveries, the information collected will be helpful in rounding out an investigation which, to be of value, should continue with increasing intensity over a period of years.

*Quail.*—On the quail range in the southern part of the State the birds continue to hold their own. In those eastern counties where a close season has been maintained for a number of years there was a larger increase reported than has been the case for some years. In previous reports we have spoken of the apparent failure of the birds to respond to this protection; but this year there is encouraging sign that they are showing some increase and spreading out into new territory. We have been very fortunate, during the past several winters, to have no storm that could be classified as a "killer."

*Deer.*—The one week of open season (December 5 to 10, 1927) saw a kill of 1,969 deer. Of these 1,062 were bucks and 907 does. They were divided by counties as follows: Barnstable, 252; Berkshire, 440; Bristol, 37; Franklin, 400; Hampden, 294; Hampshire, 157; Middlesex, 22; Norfolk, 10; Plymouth, 89; Worcester, 252; locality not reported, 16. The season was an average one, being about as favorable for the deer as for the hunters.

Deer shot while damaging crops numbered 85.

There were brought over into 1928 and paid, 100 claims filed in 1927 amounting to \$3,973.15, but which could not be settled in that year on account of lack of appropriation. There were received in 1928 141 claims, which were approved and paid in the amount of \$5,754.85. There were also received 35 claims which will be approved and paid within the coming fiscal year.

The law was further changed by providing a different method for the appraisal of damages by deer, effective September 5. By its terms the ap-



praisal is to be made by three appraisers, one to be selected by the owner of the damaged property, one by the Board of Trustees for County Aid to Agriculture (in the county where the damage occurs), and the third by the Director. Compensation for time and travel is to be paid to the appraiser for the owner, and in certain cases to the appraiser appointed by the trustees. Time alone will show whether this method will result in any more accurate appraisal of the damages than has been made in past years. The feature requiring the final approval of the Director on all claims before payment is retained.

Indications are that the total number of claims for deer damage is steadily increasing. At the present time, and despite our protests, the appropriations for these claims are included as part of the appropriation of this Division to do the things of benefit to the anglers and hunters. We continue our contention that a system should be devised for having these appraisals made entirely by experts, and that the damages should be paid by funds raised by general taxation. Recently we have made a rather superficial inquiry as to posted land, and we find that at least 180,000 acres are posted. This does not include the many large tracts which are watersheds around our municipal water supplies, nor certain other large projects such as the proposed watershed around the reservoir which is being built on the Swift River system. This alone will include upwards of 160 square miles. We believe that at least a million and a half of our people are interested in the preservation of the deer as well as the hunters who have a short open season.

While we have discussed this fully in our letter to the Budget Commissioner in the first part of this report, we repeat—that where the maintenance of a stock of desirable wild life conflicts with one of our industries, whatever damage it is deemed proper to pay should come out of the general tax levy, for the maintenance of a wild life stock is desirable for all our people.

By reason of the increase in the claims for deer damages it was considered advisable to extend the open season to include the first two weeks in December instead of the one week of open season which has prevailed so many years.

*Squirrels.*—Squirrel shooting is limited to a very small proportion of our hunters, and there is relatively small interest in this sport. The gray squirrel seems to be slightly on the increase. Disappearance of much of its food supply over portions of the State have taken squirrels out of regions where formerly they were fairly abundant.

*Hares and Rabbits.*—There is little change in the status of these animals. We have recommended the sportsmen a fifty percent reduction in the present open season. We repeat that there is no form of upland game in the United States which will stand our present open season on this species.

We have been requested by our rabbit and hare hunters to do more for them in restocking. The range of the white hare is limited, and there are many sections entirely unsuited to it. We are importing from Maine a substantial number for annual liberation. The only supply of cottontails is in some of the western states, and the presence there of the disease tularemia makes it inadvisable for us to import stock for liberation. Up to the present time we believe that Massachusetts is free from this disease, and we should remain alert to keep it so.

*Fur-bearing Animals.*—The returns for the calendar year 1928 (the law requires the report to be made for that period) are as follows: muskrat, 49,260; mink, 1,118; skunk, 10,446; red fox, 2,023; gray fox, 162; cross fox, 1; raccoon, 750; weasel, 924; otter, 33; total, 64,717. The foregoing covers the reports of 1,856 trappers.

## ENEMIES TO GAME

### *Cats*

There is a growing appreciation of the reduction of our desirable wild life by the wild hunting house cat. The sentiment in favor of reducing the numbers of these predatory cats is slowly but surely increasing. It may be years before our people will come to the point of taking hold of this problem

firmly, and devising ways and means of eliminating these homeless wild hunting cats from our countryside; but it seems in this case (as in many others) that the ravages must assume alarming proportions before the public will be sufficiently interested to act. We believe these cats are one of the greatest destructive factors operating in our covers today. During the year the county treasurers paid out \$1,130 in bounties on 113 wild cats, for which they were reimbursed from the Treasury of the Commonwealth. Wild cats appear to be on the increase, and they are especially destructive to all forms of small game as well as deer heavy with fawn in the early spring.

### *Hawks, Owls and Other Vermin*

While these predatory species were reported to some extent through the past winter, there was no such visitation as occurred in the previous year. While we favor devising ways and means of reducing certain of these species to a harmless minimum, we do not believe in extermination. Some day the principles of game administration will be sufficiently understood by our people so that adequate funds will be supplied to permit of a systematic control of all predatory animals.

### RESERVATIONS

#### *Martha's Vineyard Reservation*

Dr. Alfred O. Gross of Bowdoin College, Brunswick, Me., has continued his scientific study of the heath hen, and we have continued to rely on his recommendations. He made his annual investigation in the spring, and his report dated April 27, 1928, to the Federation of the Bird Clubs of New England, Inc., which covers the subject thoroughly, is quoted here:

"This report of the status of the Heath Hen on Martha's Vineyard is made under the auspices of the Federation of the Bird Clubs of New England, Inc. It is based on daily reports received throughout the year from Mr. Allan Keniston, superintendent of the Heath Hen Reservation, and a personal visit made to the Island during April 5 to 9 inclusive. In making the census I was assisted by Mr. Thornton W. Burgess of Springfield, Massachusetts, Mr. O. S. Pettingill, a student of ornithology at Bowdoin College, and the wardens stationed on Martha's Vineyard. In addition to our own observations we interviewed members of the local Heath Hen Committee of the Martha's Vineyard Rod and Gun Club, various sportsmen, doctors, telephone linemen, forestry men, and others who frequently traverse the interior of the Island and are thus in a position to know of the existence of any birds. To supplement these interviews 50 circular letters were addressed to persons we were unable to see personally while we were on Martha's Vineyard.

"The weather during the census was ideal for seeing a maximum number of birds. All of the places where birds have been seen or reported in recent years were visited. The maximum number of birds seen in one group, during the census, was three on the farm of James Green near West Tisbury and also in the vicinity of four corners of the Dr. Fisher Road. These places are near to each other and the birds easily fly back and forth. *The various places were visited simultaneously by those taking the census and at no time did we find a total exceeding three birds.* If three heath hen were seen at the Green farm, there were none at the Dr. Fisher Road, and *vice versa*. The three birds observed were males, and no females were noted. During the winter a maximum of seven birds was seen at the farm of James Green, but this flock has dwindled one by one until reduced to three birds. Birds were reported, during the year, from other places, such as the Thompson farm, but never on the same day when the birds on the Green farm were all accounted for. As in past years, birds were also reported, during the year, especially during the fall, at places remote from Mr. Green's farm, but the wardens and others were unable to verify these reports. Two broods of young heath hen were *reported* as seen during the summer. An inquiry made of these reports strongly indicates that they were broods of ruffed grouse (partridges) rather than heath hen. Broods of ruffed grouse were seen where the heath hen were reported. Ruffed grouse and also quail are frequently mistaken



for heath hen even by persons resident on the Island. As an example, an excellent picture of a ruffed grouse was given in good faith to the editor of the *Vineyard Gazette* as a picture of a heath hen. There is little wonder that the birds are frequently confused in the field.

"In my report to the Federation for 1927 I stated as follows:

"We were able to account for 13 birds and there are today probably less than 30 birds on the entire Island, how much less it is impossible to state. The largest number of birds seen at any one time was ten on the farm of James Green near West Tisbury. We also noted, but never on the same day, 3 birds at the Thompson Farm, 3 on the Dr. Fisher Road, 3 on the reservation, and 2 on the "Red Valley" or Bowker Road. If we should include all of these numbers, it would total 21 birds, but it should be emphasized that all of these places are within easy range of each other and a careful study of the records clearly indicates them to be duplications with the possible exception of 3 birds on the Dr. Fisher Road. During the winter all of the birds were concentrated on the Green farm and there were never more than 13 birds. In the spring when the birds began to appear at other places the Green flock dwindled correspondingly, making it obvious that the birds were dispersing from that one place. Birds were reported from five other sections of the Island but we have no evidence of their existence there other than the word of the person who reported them. A diligent search by the wardens and also repeated visits to the localities by those taking the census failed to verify the reports." (From the 1927 report to the Federation of the Bird Clubs of New England, Inc.)

"In comparing the census of 1927 with that taken this year it is at once apparent that there is a decrease in the numbers of birds. The great majority of the people interviewed in person or by letter are firm in their belief that the small group of three heath hen at Green's farm and vicinity represents all that remain. We all hope there are more than three birds left in the area of scrub oak plains but certainly all will agree that the heath hen is now at a lower level than at any time during its history.

"In 1925, when an estimate of 25 was made, only three birds were seen, but the weather conditions at that time were unfavorable for taking a census. Fewer people were interested in reporting heath hen at that time, whereas a sight of a heath hen today is an event to be reported at once and if verified is counted. Furthermore, 30 birds were seen at one time during the winter of 1925, whereas the maximum number seen during the past winter was only 7 birds.

"It is apparent that, with minor fluctuations, there has been a steady decrease since 1920, when 600 birds were the numbers estimated to be on the Island. This decrease has continued in spite of the combined efforts of the State, the Federation of Bird Clubs, and a local heath hen committee to save them from extinction.

"Last year it was recommended to discontinue the support of the special warden, Mr. Edward F. McLeod, since the Federation was convinced the State was doing all that could be done to protect the few birds that remain. Mr. Allan Keniston, superintendent of the Reservation, has submitted daily reports of his activities, including localities visited, names of persons interviewed, number of vermin killed, number and location of heath hen seen, and a general description of the day's work. Through this co-operation we have been able to keep in close touch with the heath hen situation at all times. In addition to Mr. Keniston the Division of Fisheries and Game has placed Mr. Karl Eckert on the Island to aid in general law enforcement. At the suggestion of the Federation the Division of Fisheries and Game took active steps to have nearly 3,000 acres of the Martha's Vineyard State Forest, practically all of the area now occupied by the heath hen, set aside as additional sanctuary. This action is of importance as it prevents the disturbance to the birds caused by shooting during the rabbit season. In the past I am told there was opposition to this action but now even the rabbit hunters strongly favor this action since they seem convinced of the importance of saving the heath hen. No one interviewed this year stated they



would be glad to see the heath hen go. On the contrary every one seems most desirous of having the birds protected. Unfortunately this attitude towards the birds and the active interest of a local heath hen committee is somewhat belated.

"The State Department has put into effect every recommendation made by the representative of the Federation which would serve as an aid to save the heath hen. Mr. Keniston has carefully patrolled the region inhabited by the heath hen, he has provided food for the birds, maintained trap lines throughout the year, and continued in his efforts of general vermin control.

"The stomach contents of the cats and hawks have been shipped to Bowdoin College for examination. The results of this work, contrary to our expectations, revealed but little of the remains of birds. It is a question if the wholesale slaughter of hawks whose chief food consist of rodents may not in the end so upset the balance of nature as to act as a boomerang to the heath hen. The number of rodents, in spite of the great numbers that are killed, are very abundant in the interior of the Island today. Furthermore, under normal conditions the hawks and cats would tend to eliminate the diseased and weakened birds first, which actually works out to the benefit of the species. We believe it is well to control hawks and cats on Martha's Vineyard, but it is also evident that greater importance has been placed on the killing of such predatory animals and birds than it deserves. Quail, which live in the same environment and under the same conditions on Martha's Vineyard, have greatly increased, whereas the heath hen have been steadily decreasing. It is obvious that other factors such as disease are playing a more important role in the decline of the heath hen. As has been pointed out in previous reports, the condition of excess males among the heath hen is very detrimental to the species. Furthermore, when a species becomes so greatly reduced in numbers as is the heath hen today, sterility, excessive interbreeding, and lack of sexual vigor play an important part, but these are factors over which we have no control.

#### *Disease*

"It is now well established that disease has been an important factor in the decline of the heath hen. "Blackhead" and also "Dispharynx" have been discovered to be the cause of the death of adult heath hen. According to Dr. E. E. Tyzzer of the Department of Comparative Pathology, Harvard Medical School, the presence of "Blackhead" in an adult heath hen is presumptive evidence that it is very destructive to the young. In the past turkeys were extensively raised on the Island until "Blackhead" made the business unprofitable. It is well known that poultry may act as carriers of disease and yet not be killed by it themselves. Herein lies one of the great difficulties in controlling this important factor. The heath hen have the habit of congregating about the open fields, usually near farmyards, where they come in close contact with poultry. Although there are no heath hen on the Reservation this year, the State Department removed all poultry from the reservation in 1927 and thoroughly fumigated the premises where poultry had been kept. If heath hen should reappear on the reservation, the danger from this disease will be reduced to a minimum in that part of their range. Unfortunately the chief remaining group of birds frequents the farm of James Green, where the birds feed in an open field near the barn, where every opportunity is offered for the birds to become infected through the droppings. Last fall as many as 9 and during the winter a group of 7 heath hen were regularly seen in this field, but this flock has been reduced one by one until this spring only three visit this favorite feeding and "booming" field. We have no way of knowing what happened to the other birds, but I am told that when the group was reduced to 5, one bird kept apart from the others, appeared sick and droopy, and very soon failed to appear. This case is suggestive of what may have happened to the others. In 1921, when there was a rapid decline in the numbers of birds, 5 heath hen were found dead or else in a greatly weakened and emaciated condition so that they could not fly. A sick and helpless individual was found in the fall of 1922

and another by Charles Barrett in the fall of 1924. These cases, together with the fact that both "Blackhead" and "Dispharynx" have been found to be the cause of death of adult heath hen, emphasize the importance of disease in the recent decline of the birds. "Dispharynx" is a small parasitic worm which first becomes established in the walls of the proventriculus and in advanced cases of infection works into the muscular walls of the gizzard. This parasite has proved very destructive to the ruffed grouse, especially in Southern New England. A ruffed grouse trapped by Mr. McLeod and another found dead by Mr. Allan Keniston were infected with "Dispharynx," further indicating the prevalence of this parasite among the birds of the Island. If the natural resistance of the heath hen were reduced by a series of unfavorable conditions, disease would quickly claim the few that remain.

"The State Division of Fisheries and Game up to April 1, 1928, has expended \$63,982.36 in maintaining the Heath Hen Reservation to preserve the heath hen. In spite of this great expenditure of funds and the discouraging aspects of the problem, the State has signified its intention to continue its efforts to preserve these birds, and the reservation will be maintained even after such a time as the heath hen may seem to have become extinct.

"The local heath hen committee of the Martha's Vineyard Rod and Gun Club, though requested, have not as yet submitted a report of their activities.

ALFRED O. GROSS."

Since the time of the investigation by Dr. Gross but few heath hens have been seen. Throughout the summer the superintendent reported observing no heath hens, except one on June 21 near the fire tower. On October 17 Marshall Norton saw one heath hen on the farm of James Green, and on October 28 two were seen by Mr. Green.

There were no destructive fires in any part of the heath hen range.

The birds had the same unfavorable breeding conditions as were reported for other species. No young heath hen were reported by any one.

The superintendent continues to follow the policies worked out by the Division and Dr. Gross, in order to maintain conditions on the reservation as favorable as possible for any heath hen which at any time in the future may come to it. He continued trapping through the year, and collected the following vermin: 45 cats, 11 crows, 4 hawks and 22 rats. In addition, he killed, at the request of town and farms people, at least 15 cats known to be bird killers.

#### *Penikese Island Sanctuary*

Penikese Island was operated again this year as a wild life sanctuary.

The caretaker's daily report showed that more ducks and geese visited the island during their migration than ever before. The usual live duck and geese decoys were tethered on various high projections on the island, and a good supply of grain was available at all times for wild life visiting the sanctuary.

The first terns of the common variety arrived on May 1. Representatives of the Federation of the Bird Clubs of New England, Inc., visiting the island periodically, reported a very satisfactory number of breeding birds and a good hatch of young. They found the colony in excellent condition. Approximately 1,500 terns were banded. By August 25 the entire colony had left for other regions.

Periodical inspection and autopsy of specimens of the stock of cottontail rabbits showed that both young and adults were in good condition. There were 295 trapped on the island and liberated in suitable cover on the mainland. (See Game Distribution.)

It is planned to collect a number of native cottontails from wild life sanctuaries and private estates on the mainland for replenishing and changing the brood stock at Penikese and for restocking suitable covers over the State.

A survey of the quail colony was made during the fall, and the flocks of young quail raised during the summer were trapped, wing-clipped, and banded.



Samples of the water in the duck ponds were collected by the biologist and analyzed by the Department of Public Health. They reported only a small amount of salt in the water, and from all indications it is quite desirable as a water supply for wild birds visiting the island.

Some progress was made on the reforestation of the island with Carolina poplar, beach plum, privet, buckthorn, barberry, arbor vitæ, Scotch pine and sumac. Most of this stock took hold very well, although until a winter has passed it cannot be known whether or not these varieties are suitable for the climate. This program will be expanded as funds are available for obtaining stock.

The caretaker spent considerable time in cleaning up the island and breaking up further the concrete foundations of the old buildings. No further progress can be made on this work until funds are available for more blasting.

The usual amount of vegetable food was grown during the summer as a supply of winter food for the rabbits.

The caretaker co-operated with the Biological Survey in making a census of birds visiting the island, and by banding birds when time permitted.

A boat of a good, sturdy type was purchased for use of the caretaker in obtaining supplies at Cuttyhunk and for the transportation of officials visiting the island. This boat is the only means of communication with the outside world.

#### *Other Sanctuaries*

One addition was made to the wild life sanctuaries owned by the Division—the Edward Howe Forbush Wild Life Reservation of 5,000 acres in Hancock, a gift from the Federation of the Bird Clubs of New England, Inc. This sanctuary will preserve a scenic spot in that locality, and we believe will be the nucleus of a large sanctuary by future additions. It fittingly perpetuates the great services rendered to the Commonwealth by Edward Howe Forbush during his career as State Ornithologist, and his labors in the field of applied ornithology.

Owing to lack of funds very little was done to develop any of the sanctuaries. The Wild Life Sanctuary at East Sandwich and the 26-acre addition to the Boxford Sanctuary, were surveyed.

#### *Reservations under Sections 69-75, Chapter 131, General Laws*

No new reservations were formed under this act. The period for which the Harvard Forest Reservation in Petersham had been created expired February 15, 1928. On petition it was renewed for a five-year period from June 20, 1928, to June 20, 1933.

## **INLAND FISHERIES**

### **GENERAL**

(Additional details concerning the individual species will be found under Propagation of Fish and Game, and Fish Distribution.)

For many years the Division concentrated on the production of the several species of trout and very little attention was paid to producing, by one means or another, our common species of pond fish such as pickerel, horned pout, perches, etc. We are now giving belated recognition to the needs of our ponds and larger streams. Our inland waters may properly be divided into two classes—the brooks comprising our trout waters, and our natural great ponds of over twenty acres. The former group is under the control of the riparian owners, and at any time the public may be excluded from sections or from all of a good trout stream by the action of the land owners; but public fishing is guaranteed in all natural great ponds over twenty acres in size (which are not taken over to be municipal water supplies). It is our present intention to hold our trout production at about the present proportions until we are expending an equal amount of our appropriation on the enlargement of our facilities to produce the above species for restocking our ponds and large streams.

We note a slowly increasing sentiment in favor of giving additional protection to the pond species—particularly pickerel. We can artificially prop-



agate trout and in many respects have control over the trout population in our waters: but we have an open season of three and one-half months. In contrast to this we have a ten months' open season on pickerel, and part of that comes immediately prior to the actual spawning period. We continue to point out that it is hopeless to expect to maintain an adequate stock of fish in our ponds without further protection to these species.

### BROOK TROUT

The early weeks of the season were typical of the average open season. The waters were high and the weather cold. The present policy of planting only fish large enough to be caught when put out seems to be bearing fruit, for the general reports indicated more trout taken this year, and larger fish, than for a number of years.

#### *Regulation of the Fisheries of the Deerfield River*

By Section 54-A of Chapter 130, G. L. (enacted as Chapter 74 by this year's legislature) the law establishing a restricted area in the Deerfield River for the breeding and developing of trout, was extended to include the entire river and the Director extended the scope of his previously made regulations accordingly.

### LOCH LEVEN, BROWN AND RAINBOW TROUT

The number of larger fish of these species taken during the year indicates the progress that we are making in planting brown trout (and from now on we shall consider the Loch Leven and the brown trout under the classification of "brown trout") and proves that this fish is particularly suited to our larger streams. The distribution of rainbows was small and confined almost entirely to the Deerfield River.

### CHINOOK SALMON

The results from our continued limited plantings in certain ponds where this species has seemed to do reasonably well, justifies our continuing the policy.

### WHITE PERCH

The usual salvage operations were conducted at Tashmoo Pond on Martha's Vineyard. For some unexplainable reason the fish did not come satisfactorily, and we discontinued operations after collecting and shipping only a small number as compared to previous years.

### PIKE PERCH

These fish continue to supply a limited amount of sport in the Connecticut River. Some sizable fish have been taken in several great ponds where years ago a limited stocking was made with fry. However, it is doubtful, considering the difficulties of getting an adequate supply of eggs and the hatching and transportation, whether these fish will ever be considered extensively in connection with stocking our ponds.

### PICKEREL

Progress has been made in increasing the stock of pickerel available for distribution, but we do not expect any substantial improvement until there has been a further reduction in the present open season.

### SMELT

The smelt fishery during the past fall has not been considered up to the level of previous years. The limited spawning area adjacent to the principal fishing grounds is slowly but surely being encroached upon in one way or another, so that it appears that it will only be a question of time when some of the present principal spawning waters will be entirely wiped out. The only relief apparent is that of the State acquiring the land on either side of these streams for a sufficient distance to include all of the available spawning area, and having public sentiment combine to remove the menace of pollution and encroachment over these limited areas.

## BASS

Better bass fishing has been reported in many of our waters than in previous years. Our stocking has been above the annual amount of small fish from the Palmer Hatchery, and this has been supplemented by a substantial number of brood fish collected by the salvage crews.

## HORNED POUT

This fish is gaining in popularity from year to year. We are increasing the output from our pond cultural units, and we predict that in time it will be one of the principal fish taken in our ponds, esteemed both for sport and its excellent eating qualities.

## PONDS

*Public Rights*

Apparently the public little understands the provisions of Chapter 453 of the Acts of 1923, which make it possible for ten or more residents of the Commonwealth to petition that public rights of way may be laid out to great ponds over twenty acres in area. As the stream fishing becomes more and more restricted and the public realizes its inviolate rights in the natural great ponds of twenty acres and upwards, we believe there will be a strong movement in favor of opening up such rights of way to a greater number of ponds.

In our last report we stated that such a petition was pending with reference to Walker's or Buck's pond, Harwich. A report was handed down by the board designated to act on such petition and a special report was filed with the Legislature by that board on December 30, 1927, to the effect that, upon careful consideration of all the evidence, no right of way for public access to Buck's Pond exists, and that public convenience and necessity do not require that such right of way be established. This report was heard before the Committee on Harbors and Public Lands in the Legislature. At this hearing the Director opposed the report of the above board, and advocated that a public necessity did exist, and that such right of way should be laid out. The above legislative committee visited the locality, held a public hearing on February 16, and in due course found that a public necessity did exist, and reported a bill (Senate 275) providing for such public right of way. This bill was enacted into law (Chapter 254, Acts of 1928), by which the County Commissioners were authorized and directed to lay out a right of way in the town of Harwich to Buck's Pond. The matter now rests with the County Commissioners of Barnstable County, who have sufficient authority to act when they receive a petition from the selectmen or inhabitants of the town of Harwich to take the required land by eminent domain.

A similar finding was made by the board in reference to Flax Pond, Brewster. A hearing on its report was held at the same time by the same legislative committee that acted on Buck's Pond. Also the committee investigated this pond on its travels, and discussed it at the same hearing. As the owner of all the land around this pond agreed to make it available to the public for fishing, no legislation was recommended by the Committee.

In our last report we discussed the status of natural great ponds between ten and twenty acres, showing that from Colonial times until 1869 the public had the same rights in these ponds as it had during that period, and still continues to have in natural great ponds of twenty acres and upwards. In 1869 an act was passed vesting the control of the fisheries in natural great ponds between ten and twenty acres in the riparian owners. We filed a recommendation with the Legislature of this year, providing that the public right of fishing be restored in these natural great ponds between ten and twenty acres, but it was disposed of by reference to the "next annual session." No sound reason ever existed for taking away these public rights, and we continue to recommend their restoration.

During 1928 the Waterways Division has surveyed (to establish the original area) Quinapoxet Village Pond, in Princeton and Holden. It was found to have been originally over twenty acres, and is therefore a great pond.



*Great Ponds Stocked and Closed*

The following-named ponds were stocked under Section 28, Chapter 130, General Laws, and regulations (Form 1) applied which will be in force for the periods named below. These regulations prohibit all fishing in the ponds from November 1 to May 30, and in all tributary streams except between April 15 and July 31. Fishing is permitted only with a hand line and single hook, or a single hook and line attached to a rod or pole held in the hand:

Lake Pearl (also called Whiting's Pond, Wrentham)	Jan. 15, 1928, to Nov. 1, 1930
Congamond Lakes, Southwick	Nov. 1, 1928, to Nov. 1, 1931
Long Pond (also called Long Lake) Littleton	Nov. 1, 1928, to Nov. 1, 1931
Spectacle Pond, Lancaster	Nov. 1, 1928, to Nov. 1, 1931
Watsons Pond, Taunton	Dec. 1, 1928, to Nov. 1, 1931
Quannapowitt Lake, Wakefield	Dec. 15, 1928, to Nov. 1, 1931

Under the above law the following-named ponds were stocked with regulations (Form 2) to be in force for the period Nov. 1, 1928, to Nov. 1, 1931 (except as otherwise noted). These regulations permit fishing with not more than two hooks and lines (a plug, spinner or artificial bait rigged with triple or gang hook to be considered as one hook), subject to all laws relative to the open seasons on the taking of fish:

Little Long Pond, Plymouth	Jan. 15, 1928, to Nov. 1, 1930
West Pond, Plymouth	Nov. 1, 1928, to Nov. 1, 1931
Billington Sea, Plymouth	Nov. 1, 1928, to Nov. 1, 1931

*Privately-owned or Controlled Ponds Stocked*

Following is a list of privately owned ponds (or natural great ponds from 10 to 20 acres in which the fishing rights are now vested in the riparian owners), which were stocked during the period of this report on the stipulation of the riparian owners that the public may fish therein for the period indicated (in most cases, 10 years):

<i>Pond</i>	<i>Town</i>	<i>Fishing permitted to</i>
Bates and Powers Pond	Phillipston	Feb. 25, 1938
Box Pond	Bellingham	Sept. 29, 1938
Bemis Pond	Chicopee	June 6, 1938
Beaver Pond	Franklin	Sept. 29, 1938
Cranberry Pond	Bellingham and Blackstone	Until such time as Woonsocket takes this pond as water supply
Fort Meadow Pond	Marlboro	Dec. 14, 1937
Grove Pond	Ayer	April 11, 1938
Kingsbury's Pond	Medfield	Oct. 23, 1938
Lost Lake	Groton	May 17, 1938
Mill Pond	Gardner	Jan. 23, 1938
Mill Pond (Pond south of No. Bellingham)	Bellingham	Mar. 26, 1938
Mud Pond	Winchendon	May 26, 1938
Milford Pond	Swansea	Oct. 30, 1938
Old Reservoir	Northampton	Mar. 11, 1938
Pillings Pond	Lynnfield	No date specified
Plashes Pond	Yarmouth	Dec. 2, 1937
Plow Shop Pond	Ayer	April 11, 1938
Rudd Pond	Becket	Dec. 17, 1937
South Athol Pond	Athol	Dec. 24, 1937
Small's Pond	Brewster	Dec. 2, 1937
Shirley Reservoir	Lunenburg and Shirley	Oct. 5, 1938
Tully Pond	Orange	Jan. 30, 1938
Wampatuck Pond	Hanson	Mar. 28, 1938



Following is a list of privately-owned ponds (or natural great ponds from 10 to 20 acres) stocked with the consent of the owners, but without the stipulation permitting the public to fish therein for a period of years.

<i>Pond</i>	<i>Town</i>
Flyaway Pond	Easton
Hoxies Pond	Sandwich
Long Pond (Ames Long Pond)	Easton and Stoughton
Noquochoke Pond	Dartmouth
Phillips Tack Factory Pond	Hanover and Hanson
Picker Pond	Easton
South Triangle Pond	Plymouth

In both groups of waters it is necessary that a sporting license be purchased in order to fish them.

The following privately-owned ponds were stocked on agreement by the owners to permit the Division, in future, to take an equal number of stock from the resulting increase:

Pond of Herbert R. Wolcott, located on his farm on the Belchertown Road near the Pelham Line, but in the town of Amherst, yearling horned pout and pickerel.

Hazelbrook Pond, Wayland, located on property of J. Sydney Stone, yearling trout.

Hood Pond, Beverly, located on property of C. H. Hood, mixed pond fish.

#### *Breeding Areas in Great Ponds*

Upon petition from the town of Wales received in the last fiscal year, the following described portion of Lake George (also called Wales Pond), in the town of Wales, was set aside as a breeding area for food fish of all species, for five years from December 1, 1927:

That portion lying south of a line drawn from a rock at the water's edge on the west side of the lake near the cottage owned by Wm. T. Hollister of Hartford, Conn., easterly to the northernmost part of a point of land upon which are two cottages belonging to Harry Royce of Wales, Mass.

The regulations are as follows:

"No fish of any species shall be taken from said waters without the written consent of the Director of the Division of Fisheries and Game—provided that employees of the Division may take fish for re-stocking purposes."

Violation of the regulations carries forfeiture of license and fine not exceeding twenty dollars.

A petition for similar action on Bare Hill Pond, Harvard, was received and acted on, but the regulations do not become effective until the period of the next report.

#### FISHWAYS

No new fishways were installed on alewife streams during the year. Considerable correspondence was handled at the central office on the subject of fishways and advice given on the proper methods of their construction, and plans and specifications of existing fishways were given to several interested persons. Whenever time permitted, the larger and more important fishways in the State were examined during the beginning of the run of fish, and the owners of the dams on which fishways are located were instructed to keep the fishways open from the beginning to the end of the run, and to open them again in the fall to permit the passage of young fish to the sea.

On the more important fishways, representatives of this Division were assigned to make periodical inspections to insure the safe passage of fish to the spawning grounds and to keep records of the various species observed using the fishways.

## POLLUTION

A number of pollution complaints were investigated, samples of the polluted water collected by the Health Department, and negotiations opened with the owners of the offending plants, with the end in view of curbing any further violation of the laws by the discharge of such trade waste into our rivers and streams.

## PROPAGATION OF FISH AND GAME

## FISH HATCHERIES AND GAME FARMS

*General*

We have continued our present policy of building up, in permanent form, our fish hatcheries, so as to take care of the present production. This is proceeding slowly, and it is not our intention to enlarge the productive capacity of these plants until all buildings are in good condition, adequate equipment supplied, and all existing ponds properly constructed with concrete flumes to replace many dilapidated wooden structures.

At the game farms the great need at the moment is for more brooder houses, rearing pens and holding yards.

We have continued our policy of planting only trout six inches or over in the spring. Also, with the assistance of the local fish and game clubs and individuals, we are carrying our annual production of pheasants over the winter to be liberated in the spring as adult stock.

The reforestation program was continued, as noted under the individual stations, with spruce, Scotch, red and white pine, furnished by the Division of Forestry. From the Sutton Hatchery shrubs, vines and black walnut trees were furnished.

*Ayer Game Farm*

Repairs were made on the superintendent's house to the extent of painting it, putting in a window, rebuilding a portion of the porch with concrete, and screening in the same.

A combination incubator cellar and utilities building was built.

Additional equipment was purchased, consisting of a few small portable pens, an incubator, three brooder units, and a small tractor.

Some additional work was done on the dam in connection with flowing a sizable pond for the rearing of pond fish. In this were planted 200 yearling and adult horned pout from the Stockwell Ponds.

We are carrying this property with a ten-year lease with an option of purchase. This year a strip of land across the road from the superintendent's house was added to the tract by deed from the New England Power Construction Company in exchange for a perpetual easement to run a power line across a corner of the premises.

Former Warden Edward E. Backus, who owns the farm, was transferred from the warden force on October 1 to the Game Culturist classification, and is now superintendent of this station. This is the first step towards operating it next year for the production of pheasants—heretofore it has been used only to house the egg-stock from which eggs were collected for distribution and hatching by clubs and individuals.

In continuance of the reforestation work 1,600 trees were set out, together with a selection of shrubs, fruit trees, grape and berry vines.

*Pheasants.*—There were 692 adults on hand December 1. Of these 283 were distributed for wintering during December and January, 14 were lost prior to the breeding season, and 90 distributed for liberation, leaving 305 on hand at the beginning of the laying season. To these were added 70 (50 hens and 20 cocks) purchased pheasants. From this stock 18,475 eggs were collected, of which 12,711 were sent to clubs and individuals for hatching. 525 were sent out of the State, 400 to the East Sandwich Game Farm for experimental work, 3,790 were used for feeding young pheasants, and 1,049 set in incubators in experimental work, from which 584 young pheasants hatched. There were 322 lost, 4 sent away for pathological examination, 13 distributed for liberation, 168 for wintering, and 77 remain on hand



for additions to next year's egg and brood stock. (It is planned next year to operate this station for the production of birds for distribution, as well as for the production of eggs.)

Of the 375 on hand at the beginning of the breeding season 48 were lost, 100 distributed for liberation, and 227 are held for the 1929 brood stock. There were received for brood stock 250 (hens) (1928-hatch) from the Marshfield Bird Farm, and for the egg-producing stock 250 (hens) from the East Sandwich Game Farm. Twenty-five were lost, and 475 (plus the 227 above) remain on hand November 30.

#### *East Sandwich Game Farm*

A combination garage and storage building was erected. A number of the brooder houses and adjoining yards were painted. Brush and trees were cleared off a large part of the game farm, and post holes dug preliminary to further pen construction.

For use in quail production 50 breeding pens 10 x 6 x 6 were built. Seven Putnam brooder stoves were purchased, and small brooder houses to handle them were constructed.

The land holdings were rounded out by the purchase of the Armstrong and Fish tracts, heretofore under lease. The whole property was surveyed and concrete boundary posts set up. The farm was extended by adding to it the land on the south side of the railroad track formerly part of the East Sandwich Fish Hatchery (except the Nye homestead and that area occupied by the hatchery buildings and pools). A start was made in clearing the brush and trees from this section, that it may be fenced and put in use.

Six thousand pine trees were planted, in continuation of the reforestation program, together with shrubs, fruit trees, berry and grape vines.

A substantial portion of the time during the winter months was devoted to trapping wild quail for addition to the brood stock.

*Pheasants.*—The 571 adult pheasants on hand December 1 were reduced by distribution of 95 for wintering, 28 for liberation, and loss of 58, to 390 at the beginning of the breeding season. 11,400 eggs were collected, 400 received from the Ayer Game Farm and 200 from the Marshfield Bird Farm for experimental work, making a total of 12,000 eggs set. At this, as at the other game farms, we continued our investigations on the spread between the number of eggs placed in incubators and the number of young birds reared.

6,481 young pheasants were hatched, of which 4,219 were lost, and 2,262 reared. These were disposed of as follows: 32 escaped, 1,290 distributed for wintering, 197 distributed for liberation (of which 153 were used first for field trials), 8 were given in exchange for birds liberated by an individual from his own stock, 250 (hens) sent to the Ayer Game Farm for 1929 egg stock, and 130 (hens) to the Wilbraham Game Farm for 1929 brood stock. (380 of the 1928-hatched pheasants distributed for all purposes should be classified as 1928 adults.) 355 remain on hand November 30 for additions to the brood stock and distribution next spring. There are also on hand 57 hen pheasants (1928-hatched) purchased, which will be used in making up the 1929 brood stock.

Of the 390 adults on hand at the beginning of the breeding season 46 were lost, 151 distributed for liberation, and 193 are on hand for the 1929 brood stock.

*Quail.*—The year opened with 91 adult quail on hand, 52 of which were hatchery-reared stock of 1927, to which were added 36 trapped wild birds. These 127 were reduced by loss of 29 and distribution of 2 for experiment, to 96 at the beginning of the breeding season. There was an excess of cocks, but 39 pairs were placed in separate breeding pens 10 x 6 x 6. In a corner of each pen was placed a sloping cover about 30 inches square, about 18 inches above the ground in front and 10 in the rear, to serve as a protection from the rain. The birds had otherwise only the natural ground cover, which was rather scanty at the start. After the quail had been in the pens some time it was noticed that they perched on top of these covers a great



deal of the time, and often took to jumping up and down and flying without first being alarmed. This continued more or less through the laying season. The pens were placed quite close together, which also may account for the restlessness of the birds.

The quail were very late in starting to lay, so that the first eggs came about June 30, and only 11 pairs laid at all—a total of 321 eggs. These ranged from 76 eggs from one pair to 18 from the pair producing the lowest number—one pair was killed by a weasel just as they started to lay. This very poor laying may be accounted for by the restlessness of the birds noted above, and also to the fact that all home-reared birds of 1927 were mated with wild trapped birds of last winter.

From the 321 eggs collected, 212 young were hatched and 109 eggs contained infertile and dead germs. 120 young birds were lost and 92 remain on hand November 30.

Of the 96 on hand at the beginning of the breeding season 26 were lost and 70 remain on hand November 30. All will be reserved for brood stock next year.

Considerable loss occurred while experimenting with brooders, 12 and 14 young respectively being lost in two brooders when the light blew out or the flame smothered itself by being too high. These were the last two lots to hatch in September. Also a skunk destroyed a whole setting of eggs during incubation under a bantam hen.

#### *Marshfield Bird Farm*

Most of the time during the winter was employed in remodelling the small brooder house. This consisted of a six-foot extension the entire length of the building (excepting the central heating plant) with windows in the sides, and 18 windows in the roof. The entire building was raised 2 feet and 18 ventilating windows made on the back. The house was divided up into 18 compartments and equipped with special frames covered with cloth to control drafts. The heating pipes were re-arranged and new hovers installed. The entire floor of the original brooder house and the extension was replaced with concrete. The chimney for the heater was replaced.

The portions of the large brailing yard constructed last year were wired in. The frame-work adjoining the fancy pheasant pens was covered with wire. All of the 80 portable breeding pens were taken down, thoroughly sterilized, repaired, re-painted and set up on new ground inside the large brailing yard for handling this year's brood stock. The ground inside the pens in front of the large brooder house 85 x 200 feet was removed to the depth of five to six inches, the remaining surface was heavily limed, and then refilled by a layer of from five to six inches of sand. The yards adjoining the brooder houses—five 38 x 200 feet—on the hill were similarly treated. The large yard around the orchard where formerly the brood stock was carried, was plowed under.

The inside of the large brooder houses was repaired by replacing extensive portions of the floor sills and floor and reinforcing the walls and roof.

A number of small wooden sheds were constructed for shelters in the holding yards and for use later in handling the small birds and in the rearing yards. Most of the grass and brush in the large brailing yard was mowed and shelters constructed for carrying the birds through the winter.

Windows, doors and chimneys were added to complete the five brooder houses and pens on the hill.

In continuance of the reforestation program 1,750 trees were set out, as well as a selection of shrubs, grape and berry vines, and fruit trees.

Miscellaneous repairs were made on the heating system, and considerable painting done throughout the plant.

*Pheasants.*—The year opened with 491 adults on hand, which were reduced by losses of 18, distribution for liberation of 69, and 3 escapes, to 401 at the beginning of the breeding season.

There were 13,630 eggs collected, 200 of which were sent to the East Sandwich Game Farm for experimental work, and 13,430 set in incubators.

5,868 eggs proved infertile, and 7,562 chicks hatched. Of these 3,940 were lost and 3,622 reared and disposed of as follows: 100 distributed for liberation (of which 50 were used first for field trials), 1,979 sent out for wintering, 16 given in exchange for birds sent to the Wilbraham Game Farm from a private breeder, and 166 transferred to the brood stock. 250 (hens) were sent to the Ayer Game Farm for part of the 1929 egg stock, and 240 (hens) to the Wilbraham Game Farm for part of the 1929 brood stock. (750 of the 1928-hatched pheasants distributed for all purposes should be classified as 1928 adults.) There remain 871 on hand November 30, for additions to brood stocks at this and other stations and for spring liberation.

Of the 401 adults on hand at the beginning of the breeding season 12 were lost and 389 remain on hand November 30 plus the 166 1928-hatched brood stock.

#### *Wilbraham Game Farm*

On December 1, 1927, Frederick W. Wood, caretaker of the Penikese Island Sanctuary, was promoted to the position of Superintendent of the Wilbraham Game Farm, made vacant by the resignation on the last day of the previous fiscal year, of Mrs. Alice E. Mosher.

A portion of the fence surrounding the large brailing yard was re-located to greatly increase the size of the yard. Repairs were made on a number of the brooder houses and on some of the rearing yards.

A small amount of additional equipment was added, such as brooder stoves, feed hoppers, etc.

In continuance of the reforestation work, 1,500 trees were set out, together with a selection of fruit trees, grape and berry vines.

*Pheasants.*—The 420 adults on hand December 1 were reduced by losses of 11, distribution of 8 for liberation, and distribution of 8 for wintering, to 393 at the beginning of the breeding season.

14,016 eggs were collected, 54 of which were broken and 13,962 set in incubators. 6,388 were infertile in incubators or contained dead germs, and 7,574 hatched. Beginning the week of July 29 there were abnormal losses among the pheasants up to fifteen days old. The birds appeared to be perfectly well and very active, and then would suddenly flop over and die without warning. White droppings were noticed on the feeding boards three to four days before the heavy mortality started, but these were thought to be due to feeding semi-solid buttermilk.

The best scientists available, and authorities on bird diseases and bird culture, were immediately consulted. Two of them visited the game farm personally and carefully studied the conditions under which the young birds had been hatched and reared. They also advised the superintendent as to the proper methods of treatment and prevention of spreading the epidemic further. Specimens were autopsied on the grounds, and several specimens taken away for laboratory study. Living and dead specimens of young pheasants of all ages, as well as of the breeding stock, were sent away for observation and autopsy, and the reports of the findings from the independent scientists performing these autopsies proved that coccidiosis was present among the young pheasants, and three of the brood stock autopsied were found to be suffering from tuberculosis.

Up to the time of the outbreak of this epidemic some of the brood stock had been shipped away. Upon receiving the reports of the examination of the adult birds, the remaining adult stock was quarantined in an isolated section of the farm pending a decision as to its disposition. By the middle of August conditions appeared normal and extremely warm weather and sun cleared up much of the trouble. Of the 7,574 pheasants hatched 5,161 were lost, 2,413 reared and disposed of as follows: 24 sent away for pathological examination, 2 escaped, and 2,387 distributed for wintering (373 of the 1928-hatched pheasants distributed for all purposes should be classified as 1928 adults.) At the close of the year there are no 1928-hatched pheasants on hand.

Of the 393 on hand at the beginning of the breeding season 133 were lost,



2 escaped, 20 were sent away for pathological examination, 42 distributed for liberation, and 196 remain on hand November 30.

For part of the brood stock of 1929 there were received (all 1928-hatched stock) 130 (hens) from the East Sandwich Game Farm, 240 (hens) from the Marshfield Game Farm, 50 (cocks) from a private breeder (34 of which were purchased and 16 received in exchange for an equal number from the Marshfield Game Farm). Of these 420 birds, 2 escaped, 29 were lost and 389 remain on hand November 30.

#### *Amherst Rearing Station*

The superintendent's cottage received additional inside repairs and equipment.

Three-inch galvanized iron pipe was laid to place under ground our principal water conduit, making possible the removal of an unsightly wooden trough. A new tile system was laid so that a large portion of the pools could be cleaned without the waste passing through the remaining pools.

The four large ponds and the square head-pond in connection with them, which have been under construction for over a year, were completed.

The wooden holding boxes were relocated in conjunction with the sorting troughs, all abreast of the loading stand, which will facilitate the handling of fish and greatly improves the appearance of the grounds.

The outbuildings received a coat of paint.

In continuance of the reforestation program, 3,125 trees were set out, together with a selection of shrubs, fruit trees, grape and berry vines.

With the purchase of the Bartlett-Whitcomb and the Clark tracts, all of the land previously held under lease is now owned by the Division.

*Brook Trout.*—The year opened with 27,680 fingerling brook trout on hand (a recount added 680 to the previous inventory). These were all distributed in the spring as yearlings.

For the work of the season 111,000 fry were received from the Montague Fish Hatchery. There were losses of 29,000 as fry and 82,000 were reared to fingerlings. There were 6,600 fingerlings lost, 20,400 distributed, and 55,000 remain on hand to be carried through the winter for spring distribution.

*Brown Trout.*—From the beginning of the year both brown trout and Loch Leven trout have been grouped under the term "brown trout," in our records. The year opened with 14,000 brown trout fingerlings on hand, which were transferred to yearlings. 452 were lost, 8,548 distributed to open waters (of which 24 went first to the Eastern States Exposition, 12 to the Franklin County Agricultural Society's Fair at Greenfield, and 12 to the fair of the Worcester Agricultural Society at Worcester), and 5,000 remain on hand November 30.

The 200 yearlings on hand at the beginning of the year were added to the 1,477 adults carried over from the previous year (a recount added 144 to the 1,333 recorded as being on hand at the close of last year). To these were added four received from the Palmer Fish Hatchery. 133 were lost, 598 distributed to open waters (of which 12 went first to the Eastern States Exposition, 7 to the Franklin County Agricultural Society's Fair at Greenfield, and 6 to the fair of the Worcester Agricultural Society at Worcester), and 950 remain on hand November 30.

For the work of the season 351,600 eggs were collected and sent to the Palmer Fish Hatchery for hatching. 72,200 fry from these eggs, and 95,580 fry from eggs received from the U. S. Bureau of Fisheries Station at Bozeman, Mont., hatched at Palmer, were received for further rearing. 155,780 were lost, 100 distributed as fingerlings (first going to the Eastern States Exposition), and 11,900 remain on hand November 30.

#### *East Sandwich Fish Hatchery*

The Nye house was repaired by replacing a window on the front side, placing cap over the front door, and repairing and replacing shutters.

A porch to the meat house was rebuilt.



One of the pools was filled with gravel sufficiently to facilitate cleaning, and the hatchery grounds drained by the laying of considerable tile.

Several small pools were dug on the westerly side of the pond in order to provide additional waters in which to start fry.

Practically all of the former hatchery grounds (except that portion immediately around the rearing pools and round the Nye house) was added to the East Sandwich Game Farm.

Continuing the reforestation program, 2,750 trees were set out (of which 50 were black walnut), together with shrubs, fruit trees, grape and berry vines.

A survey of the grounds was started, but had not been completed at the close of the year.

*Brook Trout.*—The year opened with 43,650 fingerling brook trout on hand. 15,872 were lost and 27,778 reared and transferred to yearlings. Of these 1,208 were lost, 22,710 (6 inches or over) were distributed to open waters, 600 were sent to club rearing pools, and 3,260 placed in the large pond for further growth and are on hand November 30.

For the work of the season 70,000 fry were received from the Sandwich Fish Hatchery, 25,065 of which were lost and 44,935 reared and transferred to fingerlings. To these were added 35,000 fingerlings received from the Sandwich Fish Hatchery. 21,915 were lost, and 58,020 are on hand November 30 to be carried through the winter for spring distribution.

*Chinook Salmon.*—The year opened with 4,922 fingerlings and 221 yearlings on hand. 22 fingerlings were lost, and 4,900 fingerlings and the 221 yearlings were distributed to open waters.

*Blue Gills and Crappie.*—6,000 fingerling blue gills and 4,000 fingerling crappie from the Stockwell Ponds were planted in the large pond on the hatchery grounds as an effort to establish a brood stock of pond fish at this station.

*Steelhead Trout.*—25,000 steelhead trout eggs received from the U. S. Bureau of Fisheries Station in Oregon resulted in 14,500 fry, which were distributed.

#### *Montague Fish Hatchery*

The outstanding addition to the plant was the partial erection of a home, on the grounds, for the superintendent. It consists of a ready-cut, eleven-room house purchased from the Aladdin Company of Bay City, Mich. It was erected on a concrete foundation, with a cellar extending the entire length of the house—the cellar floor of concrete. The building was constructed to the extent of completing the exterior finish, and then locked up to await completion out of next year's appropriations.

The meat house was repainted.

Extensive improvements were made to the road through the hatchery grounds.

Additional work was done in the way of digging the new channel of the brook before it could be changed. At the outlet of the new bed of the brook a concrete dam with spillway was constructed to regulate the flow of water in the brook.

The large wooden dam on the pond series below the hatchery building was replaced with one of concrete, and a portion of the brook below walled up with stone. A run-off ditch at one side of this dam was placed under ground with galvanized iron pipe. The whole location was regraded. A number of wooden dams upstream from the above large dam were replaced with concrete, together with a concrete flume in front of the hatchery building. This included dams for the small nursery ponds and at a cut-out in the run-off brook.

A large number of stumps, and much brush, were removed from the ground generally.

With the additional contributions from the Franklin County League of Sportsmen's Clubs, received in the fall, construction was started on an additional series of large rearing pools on the area that had been cleared of stumps earlier in the year.

The White truck formerly used by Salvage Unit No. 1 was transferred to this station and the Reo truck was sent to the Palmer Fish Hatchery to replace a worn-out Stewart.

In continuance of the reforestation program, 10,429 trees were set out, together with shrubs, fruit trees, grape and berry vines.

The grounds were completely surveyed.

*Brook Trout.*—The year opened with 93,800 fingerling brook trout on hand. 1,300 were lost as fingerlings, 4,000 were distributed to local brooks, and 88,500 were transferred to yearlings. 9,770 of these were lost, 75,730 yearlings were distributed to open waters (of which 72,320 were 6 inches or over), and 3,000 were distributed to club rearing pools.

There were 384 yearlings on hand at the beginning of the year, of which 109 were lost, and 275 transferred to adults and added to the 443 carried over from last year (a recount added 150 to the 293 recorded as being on hand at the close of the previous year). 50 were lost, 18 distributed to open waters (12 going first to the Eastern States Exposition and 6 to the fair of the Worcester Agricultural Society) and 650 remain on hand November 30.

For the work of the season 420,000 brook trout eggs were received from the Sandwich Fish Hatchery. 39,000 were lost, and 381,000 fry hatched. Of these 35,000 were lost, 111,000 transferred to the Amherst Rearing Station, and 235,000 reared to fingerlings. These were disposed of as follows: 86,350 were lost, 26,350 distributed to local brooks (of which 100 went first to the Eastern States Exposition), 12,000 to club rearing pools, and 17,300 to the U. S. Bureau of Fisheries Station at Nashua, N. H. (5,000 in exchange for rainbow trout received this year, and 12,300 for rainbow trout to be received in the spring of 1929). 93,000 remain on hand November 30 to be carried through the winter for spring distribution.

*Rainbow Trout.*—The year opened with 40 yearling rainbow trout on hand which were transferred to adults. 8 were lost, 12 distributed to open waters (of which 8 went first to the Eastern States Exposition and 4 to the fair of the Worcester Agricultural Society), and 20 remain on hand November 30.

There were on hand at the beginning of the year 14,000 rainbow trout fry and fingerlings, 6,200 of which were lost as fingerlings, 6,000 distributed as fingerlings, and 1,800 yearlings remain on hand November 30.

5,000 fingerlings were received from the U. S. Bureau of Fisheries Station at Nashua, N. H., in exchange for an equal number of brook trout fingerlings. 1,200 were lost and 3,800 remain on hand November 30.

#### *Palmer Fish Hatchery*

A new roof was put on the double tenement house and the house was generally repaired, outside and in. Minor repairs were also made on the superintendent's house, and a small section of wooden walk replaced by one of concrete.

Repairs were made to a portion of the floor of the hatchery building.

The shiner pond was cleaned out over a substantial area, near the dam, to permit of the better seining of the pond. The remaining banks of the trout pools were raised for winter rearing of trout.

The water supply brooks were opened up to increase the volume.

Additional grading was done around some of the ponds; the driveway to the trout pools was partly resurfaced with cinders; markers were set and a line struck for the proposed pond below the bass ponds.

Continuing the reforestation program, 1,050 trees were set out, together with a selection of shrubs, fruit trees, grape and berry vines.

*Brook Trout.*—The year opened with 37,263 fingerling brook trout on hand. 1,952 were lost and 35,311 transferred to yearlings. 12 were given away for research work, 14,328 were lost, 500 distributed to club rearing pools, 20,471 distributed to open waters (all of which were 6 inches or over).

40 adults were collected from the back brook on the hatchery grounds and distributed to open waters.

For the work of the season 80,000 brook trout eggs were received from the



Sandwich Fish Hatchery. 2,000 were turned over to the South Boston Aquarium, 6,828 were lost, and 71,172 fry hatched. Of the fry 7,122 were lost and 64,050 were reared and transferred to fingerlings. To these were added 10,000 from the Sandwich Fish Hatchery. 11,900 were lost, 23,300 distributed to local brooks, and 38,850 remain on hand November 30.

*Brown Trout.*—From the beginning of this year both brown trout and Loch Leven trout have been grouped under the term "brown trout" in our records. 351,600 eggs were received from the Amherst Rearing Station for hatching. It was three months before there was any evidence of these eggs eyeing out, and those that hatched proved to be very poor and many of them died almost immediately after hatching. In addition 100,000 eggs were received from the U. S. Bureau of Fisheries Station at Bozeman, Montana, in exchange for brook trout eggs. 200 of the eggs were given away for study purposes. The remainder hatched satisfactorily, resulting in 289,868 fry, of which 122,088 were lost and 167,780 transferred to the Amherst Rearing Station. (2,200 of these were fry from the eggs collected at Amherst Rearing Station, and 165,580 from the U. S. Bureau of Fisheries eggs).

Four adult brown trout (from one of the supply ponds) were sent to the Amherst Rearing Station, and 2 were distributed to open waters (one going first for display in a store window and one being first tagged for experimental purposes).

*Small-mouth Black Bass.*—There were 449 adults on hand at the opening of the year. 49 were lost, 10 distributed to open waters (of which 4 went first to the Eastern States Exposition and 6 to the fair of the Worcester Agricultural Society). 34 adults from Crystal Lake, Wakefield, were added to this brood stock, so that 424 remain on hand November 30.

From the bass ponds there were collected and distributed 277,500 fry and 16,652 fingerlings (of which 100 went first to the Eastern States Exposition and 52 to the fair of the Worcester County Agricultural Society).

*Large-mouth Black Bass.*—From the supply pond 2 adults were distributed to open waters (first going to the Eastern States Exposition).

*Blue Gills.*—From the supply pond 432 adult blue gills were collected, 267 of which were transferred to the Stockwell Ponds for brood stock, and 165 distributed to open waters.

*Horned Pout.*—400 adult horned pout on hand at the beginning of the year remain on hand November 30.

From the supply pond 8,000 fingerling horned pout were collected and distributed to open waters.

The adult horned pout salvaged from the private pond of E. A. Wood, in Prescott, were held at the station for a period, and later distributed.

*Pickarel.*—The adult pickarel salvaged from the private pond of E. A. Wood of Prescott, were held at the station for a time, and later distributed.

From the supply pond 22 fingerlings, 84 yearlings and adults, were collected and distributed to open waters (of which 8 fingerlings and 24 yearlings and adults went first to the Eastern States Exposition).

#### *Sandwich Fish Hatchery*

The hatchery building was extended and put on a concrete foundation, and a new roof of fire-proof shingles put on.

Two additional large ponds were constructed to hold an increased amount of brood stock, and wells driven to supply additional water to these pools.

In continuance of the reforestation program, 1,900 trees were set out, together with a selection of shrubs, fruit trees, grape and berry vines.

A survey of the grounds was begun, which had not been completed at the close of the year.

*Brook Trout.*—The year opened with 99,910 fingerling brook trout on hand. 255 were lost, 24 distributed for study purposes, and 99,631 reared and transferred to yearlings. 16,746 were lost, 67,135 distributed to open waters (all over 6 inches), (of which 35 went first to the Quincy Trading Post). 9,300 were sent to club rearing pools and 6,450 remain on hand November 30.



There were 3,149 yearlings on hand at the beginning of the year. 160 were lost, and 2,989 reared and added to the 1,600 adults brought over from last year. 675 were lost, 901 distributed to open waters, (1 went first to the Quincy Trading Post), and 3,013 are on hand November 30.

1,190,000 eggs were collected from station stock and 25,000 wild brook trout eggs were received from the U. S. Bureau of Fisheries Station at Berlin, N. H. 35,400 eggs were lost, 420,000 sent to the Montague Fish Hatchery, 80,000 were sent to the Palmer Fish Hatchery, 500 distributed for study purposes, and 50,000 were sent to the California Fish and Game Commission in exchange for Chinook salmon eggs to be shipped to us in the next fiscal year. 629,100 fry were hatched. Of these 75,000 were lost, 70,000 transferred to the East Sandwich Rearing Station, 76,800 transferred to the Sutton Fish Hatchery, 100 distributed (going first to the Quincy Trading Post), and 407,200 reared and transferred to fingerlings. 175,300 fingerlings were lost, 10,000 transferred to the Palmer Fish Hatchery, 35,000 transferred to the East Sandwich Rearing Station, 60,000 sent to club rearing pools, 23,000 planted in local brooks, and 103,900 are on hand November 30.

### *Sutton Fish Hatchery*

Inside repairs and additions were made to the house on the grounds. A new roof was put on the wagon shed. Additional fill was added to the road into the hatchery grounds; and fence posts set for a new line of fencing to replace that washed out by the flood of the previous year.

A part of the outside buildings was repainted.

Forestry work at the hatchery is largely in connection with the work at the pond units. 2,500 trees were transferred to the ponds from beds on the hatchery grounds. 8,000 forest trees were received from the Division of Forestry, of which 100 were shipped to Penikese Island Sanctuary, 2,700 placed in beds at the hatchery, and the remainder planted around the ponds as noted elsewhere.

*Brook Trout.*—The year opened with 35,000 fingerling brook trout on hand, which were reared and transferred to yearlings. 15,065 were lost, 19,935 distributed to open waters (18,010 of which were 6 inches or over).

For the work of the season 76,800 fry were received from the Sandwich Fish Hatchery, which were reared and transferred to fingerlings. 36,600 were lost, 50 distributed to open waters (going first to the fair of the Worcester Agricultural Society), 150 given away for experimental purposes and study, and 40,000 remain on hand November 30 to be carried through the winter for spring distribution.

### FIELD PROPAGATION

#### *Stockwell Ponds Unit*

In furtherance of our policy of building up the production of pond fish, the following work was done on the pond cultural units operated in conjunction with the Sutton Fish Hatchery.

Owing to seepage in the fill at the Arnold dam, which was of loose material dumped off when the pond was full, that portion was dug out when the pond was drained, and spread out on a wider base, and the fill completed with heavy loam well compacted and a gravel face. Further protection wall was built around the upper part of the flume. The stone facing on the lower side of the dam was carried higher and additional fill made to level off the top of the dam.

While employing a power shovel for this work the road to the dam was graded, and a road cut through the sand hill to the Freeland Cove, where reserved brood stock is held.

Throughout the entire winter a large amount of trees and brush were removed from the middle dam in the area to be flowed. Additional fill was placed on the middle dam to increase its height and the stone facing carried up an equal distance.

A heavy fill was made across Schoolhouse dam to permit raising the water some two feet above the former level. At the east end a loose rock fill

was dug out to the bottom of the pond and replaced with the new material, and through the whole length the new fill was held at the shore line on a footing of heavy boulders.

The stone raceway in the Putnam dam was laid up to a point which would permit of building the stone facing on the upper side of the dam out to a considerable distance on each side of the flume. In addition, substantial fill was made on one side in order that stone walls could be carried up some three feet above the water level as a safeguard to traffic using the two roads which cross adjacent to this dam. The plank drift shield at the outlet was removed, and the new wall was carried across on a reinforced concrete bridge to serve in its place.

#### *Sutton-Thompson Unit*

On the Thompson dam the stone facing on the up-stream side was carried to a substantial height and on the down-stream side to an equal height around the outlet. A heavy fill was made to permit carrying a good head of water in the Thompson pond during the coming year. Material for the fill was taken, in part, from a cut at the south end that will serve as a storm overflow when the pond is completed.

The Town of Sutton dam was repaired to stop some seepage which appeared after the pond was run full, and as this seepage appeared to be due to loose material in the old part of the dam dating back to the eighteenth century, a line of plank piling was carried through it.

#### *Welsh-Sullivan Unit*

Construction was started on the dam at the outlet of the brook on the Welsh-Sullivan tracts. This dam is built of heavy stone, reinforced with concrete, backed with a heavy clay fill, and when completed will make an additional pond of about twenty-five acres. The work around the flume was carried up to the maximum height contemplated and the wings extended to a point which will permit of a partial filling of the pond during the coming year. As a further extension of the wings for an eventual raise of level, dykes were built of material thrown up from the bottom clay of the pond.

A substantial number of trees and a large amount of brush were removed from all these pond locations. Co-operative work was done by the Town of Sutton in raising the road levels and building a larger culvert at the head of the Welsh Pond.

Extensive reforestation was done around all the ponds in this series, and considerable upland was cleared of reserved growth, dead and broken trees, by the lessors, for future planting.

#### *Breeding and Production*

The breeding, production and distribution at all the ponds are reported on collectively. This for the reason that the units are not yet sufficiently developed to be handled separately.

The breeding was normal, or better, with all fish except pickerel. Pickerel fingerlings were found in the ponds only in small numbers, and the distribution was mainly of yearlings from the fingerlings left in the ponds the previous year. The cause appeared to be mainly that it was a non-breeding year for pickerel, but a possible contributing cause was found in the presence of otter, late in the season, and a considerable depletion of the larger breeding pickerel, the inference being that the otter were there early and had fed on the larger fish, pickerel by preference as being the largest and easiest to catch. The production of blue gills was unusually large and the growth was above the average, probably due to a better adjustment of stock, as the shiners, which had been increasing in the ponds and which appeared to be feeding in competition with the blue gills, and to a large extent on the blue gill fry, had been largely removed the previous year. They had been kept in the ponds as pickerel food, but observation showed that they not only kept down the blue gill production, but were not the main food for pickerel, the latter preferring blue gills.



The number of breeding perch was reduced, as there was ample stock of other fish, and the main production was yearlings and adults grown from left-over stock.

The horned pout production was good, but the main distribution was fingerlings as the stock of larger fish was well reduced the previous year in the belief that an excessive stock of large fish interfered with the production of fingerlings.

Crappie was bred for the first time and gave a large production of good fish, the rate of growth being possibly three times that of blue gills. In May 1,395 brood fish were put in the ponds, and the production of fingerlings exceeded 100,000 for distribution, with over 10,000 retained to grow for future stock.

The ponds are handled as one unit in taking out and distributing fish, as only the Stockwell Ponds have traps for catching. The Sutton-Thompson Ponds feed into the Stockwell Ponds, and so far it has been necessary to drain these into the Arnold Pond, the upper one of the Stockwell Unit, and handle the fish together. The Welsh Pond received no stock, as construction was started during the year, but the flowage from the first construction work received some fish ascending the stream from Lake Singletary and escapes from the Stockwell Ponds above, and yielded a considerable stock of perch, pickerel, and horned pout, taken in a temporary trap. The Sutton Pond was operated its second year, and yielded a full stock of blue gills, crappie, and horned pout. Construction on the Thompson Pond was advanced in time to receive some of the crappie brought in during May, and produced a large stock from a few hundred of these.

The production was good in all of the Stockwell Ponds, but the increase for the year was largely due to the pond flowed by the new dam, construction of which started last year. This proved to be one of the best ponds, although it was flowed to only half the intended level.

#### *Restocking*

The same general mixed stock of breeders was returned to the Stockwell Ponds, the blue gills and crappie, largely in the upper ponds on account of their tendency to drift down, but the New Pond and the Fish Pond, received an additional stock of fingerling blue gills, crappie and horned pout, to grow for yearling stock for distribution, and for increase of breeders. These ponds were taken for this purpose on account of the new flowage, and consequent greater feeding capacity.

The Sutton-Thompson Ponds were stocked largely with horned pout, for, if the development of the next year provides a trap for these ponds, this stock can be taken and distributed earlier with the blue gills and crappie, whereas under the present arrangement no great numbers of horned pout are taken until the distribution of blue gills and crappie is nearly finished. The construction of the Thompson Pond was so largely advanced that the area of new flowage will be too large for breeding horned pout safely, and this pond will be used wholly for growing yearling horned pout. So far, the horned pout fry has been found to be the only fish that will not live through a period of excessive fermentation in a newly flowed pond, and the danger of loss comes in a period of excessive heat before it is many weeks old. Larger horned pout and all other fish, except possibly white perch, seem hardy under any condition.

The following stock was placed in the ponds: 267 adult blue gills from the Palmer Hatchery; 200 adult horned pout salvaged from Wood's Pond in Prescott; 1,340 adult crappie or calico bass salvaged from General Butler Ames' Pond in Tewksbury.

#### *Distribution*

The distribution was very largely of blue gills and crappie, owing to the great yield of these fish and the necessity for taking them unmixed with other fish, which is accomplished by drawing the ponds at such a rate that they will leave while all other fish remain until the water gets to a lower



stage. During this period they can be handled without loss. In the final work, however, when those remaining come with other fish in mixture (this mixture including the brood stock), the liability of loss is considerable, and consequently it is necessary to take and distribute them without regard to the fish listed. The segregation of fish in certain ponds, and improved facilities for trapping and holding, will eventually make it possible to ship the fish in the proportions desired.

Distributions from the ponds for the period of this report (December 1, 1927, to November 30, 1928) totalled 375,261 fish, as follows: Blue gills—225,310 fingerlings of which 215,750 went to open waters (100 going first to the Eastern States Exposition and 50 to the fair of the Worcester Agricultural Society), 3,450 to club rearing pools, 6,000 to the East Sandwich Fish Hatchery to be held for further growth, 100 to the South Boston Aquarium, and 10 for study purposes; 687 yearlings and adults, of which 640 went to open waters (30 going first to the Eastern States Exposition and 10 to the fair of the Worcester Agricultural Society), 16 for study, and 31 to the South Boston Aquarium.

Horned pout—15,310 fingerlings, of which 14,300 went to open waters, 1,000 to club rearing stations and 10 for study; 16,547 yearlings and adults, of which 16,335 went to open waters (10 going first to the fair of the Worcester Agricultural Society), 200 to pond on the Ayer Game Farm, 8 for study, and 4 to the South Boston Aquarium.

Yellow perch—12,825 fingerlings, of which 12,800 went to open waters and 25 for study; 7,710 yearlings and adults to open waters (of which 30 went first to the Eastern States Exposition).

Crappie—93,250 fingerlings, of which 87,100 went to open waters (100 going first to the Eastern States Exposition and 50 to the fair of the Worcester Agricultural Society), 2,050 to club rearing stations, 4,000 to the East Sandwich Fish Hatchery for further growth, and 100 to the South Boston Aquarium; 29 adults, of which 11 went to open waters (one going first to the Eastern States Exposition and 10 to the fair of the Worcester Agricultural Society), and 18 to the South Boston Aquarium.

Pickereel—535 fingerlings (6 to 9 in.) (525 to open waters and 10 for study); 3,058 yearlings and adults (10 to 16 in.), of which 3,021 went to open waters (6 going first to the fair of the Worcester Agricultural Society), and 37 to the South Boston Aquarium).

## FISH AND GAME DISTRIBUTION

### FISH DISTRIBUTION

The distribution and transportation of the stock of fish reared at the hatcheries was made almost entirely by the hatchery or salvage trucks, and by trucks sent to the stations by the sportsmen's associations. The movement of this vast amount of fish stock was begun in January, the extremely mild and open winter making access to certain of the brooks possible, and the work was completed about the last of June.

*Brook Trout.*—By the fall of 1927 each station had selected sufficient of its choicest 1927-hatched fingerlings to carry through the winter for liberation in the spring of 1928 as yearlings.

There were distributed (as by-products) 97,100 fingerlings (4,000 of which were 1927-hatched and 93,100 1928-hatched). It is not part of our plan of distribution to plant fingerling fish; but, in concentrating on the distribution of yearling fish only, there are bound to be some fingerlings and yearlings which must be disposed of in some way to prevent overcrowding of the yearling stock.

There were distributed from all the hatcheries, either to public waters or to the local clubs for further rearing, 247,061 yearling brook trout (of which 234,776 were six inches or over). (See tables of distribution at the end of this section). In carrying a large stock of trout through the winter to become yearlings for spring planting, there will inevitably be a considerable number which, though of yearling age, have not grown to the legal size before the

distribution period is over—this for the reason that all fish do not grow uniformly. We aim to complete the distribution of yearling brook trout each year about May 15, although it sometimes runs longer, owing to weather conditions. As a result there are some yearlings at that time which have not developed to the six-inch size. If these fish were taken by the clubs at that time, carried in ponds or pools and fed well, they should be well over six inches by September first, when they could be planted in public waters, or even held longer. Such an arrangement would eliminate the necessity of planting these undersized yearlings. There is no room to carry them longer at our own stations, for the yearling pools must have a "rest," that is, be sterilized and sunned to insure clean, sanitary conditions preparatory to their use for the young stock coming along through the summer. It is through this medium that the clubs have become interested in establishing rearing pools and carrying fish through until fall, and many have availed themselves of the opportunity. In some instances they have grown trout to a size of 8 to 10 inches. Had they been distributed in the spring at under six inches the stocking would have been much less effective.

There were 959 adult trout distributed to open waters. At the close of the year there are on hand at all the stations 388,770 1928-hatched fingerlings, 9,710 yearlings, and 3,663 adult brook trout.

Experimental stocking of ponds with the large, stripped brook trout was continued in the following ponds: Lake Garfield, Monterey; Onota Lake, Pittsfield; Job's Neck Pond, Edgartown; Lake Archer, Wrentham.

*Brown Trout.*—Special attention has been given in the past few years to building up a brood stock of selected brown trout, from which we aim to collect annually about 300,000 eggs for the production of fish for planting. We now have such a stock at the Amherst Rearing Station, and it is expected that the above number of eggs will be taken this year.

In addition to completing the selection of this brood stock, 100 fingerlings (used first for display purposes), 8,548 yearling and 500 adult brown trout were distributed to open waters. At the close of the year there are on hand 950 adult and 5,000 yearling brown trout being carried through the winter for further growth and additions to the brood stock, in addition to 11,900 1928-hatched fingerlings.

*Steelhead Trout.*—The 14,500 steelhead trout fry from the eggs from the U. S. Bureau of Fisheries, were planted in Scorton Creek, Sandwich.

*Rainbow Trout.*—The only rainbow trout distributed during the year were 6,000 fingerlings and 12 adults. There are on hand at the close of the year 20 adults, 1,800 yearlings and 3,800 fingerlings.

*Chinook Salmon.*—All the stock remaining from the eggs hatched in December of 1926, consisting of 4,900 fingerlings and 221 yearlings, was distributed in specially selected waters.

An exchange of 50,000 Chinook salmon eggs for brook trout eggs was arranged with the California commission in the fall of 1927, and 50,000 brook trout eggs were shipped to them at that time. Owing to a very bad egg-taking season, the California commission was unable to make a shipment to us; therefore they are to supply them in December of 1929.

*White Perch.*—All the adult white perch salvaged from Tashmoo Pond on Martha's Vineyard were planted this year in specially-selected, natural great ponds of over twenty acres, and in ponds under twenty acres whose owners had agreed to permit the public to fish them for a period of years. The stocking of such private ponds automatically brings them into that classification of ponds requiring a sporting license to fish them.

*Work of the Salvage Unit.*—The scope of the salvage work was enlarged by the purchase of sufficient gear, cans and the new large truck to put into the field Salvage Unit No. 2. The truck formerly used by Salvage Unit No. 1 was turned over to the Montague Fish Hatchery, and a new truck purchased. These two units are in the hands of wardens who have grown up in the work of handling fish and in salvaging work of various kinds, and are eligible to transfer to the Fish Culturist classification which will take place in due course.



Progress was made in salvaging fish out of municipal water supplies. Conferences were held with officers of the State Department of Public Health on all phases of the work. One conference was held with such officers and representatives of a limited number of local water boards. The sentiment appears to favor permitting this work to be done in the municipal water supplies; but opposed to any stocking of these water supplies by the Division.

Salvage operations resulted in the collection of 81,404 fish.

From April 4 to 29 Salvage Unit No. 1 operated on Martha's Vineyard collecting white perch from Tashmoo Pond, Tisbury. The work began on April 4 and continued four days, but with poor success. The weather was extremely mild and not at all the kind suitable for catching perch in the headwaters or spring holes. The salvage operations at this pond were discontinued after April 21, after one of the most disappointing seasons the salvage crew has ever experienced, having worked much harder than ever before and with less result. There were 19,000 adult white perch (5 to 7 in.) collected and distributed to public waters.

On April 24 Salvage Unit No. 2 transported its gear to Silver Lake, Halifax, Kingston, Plympton and Pembroke (water supply for the city of Brockton), at the request of the sportsmen of the latter city. They operated here from April 24 to 30. Having fished the lake at six of the most likely spots, and having collected only 500 suckers, 1 bass, 20 yellow perch and 1 pickerel (all of which were returned to the lake), the gear was pulled on April 30 as it did not seem profitable to continue the work with the poor results obtained.

From May 14 to 24, salvage operations were carried on at General Butler Ames Pond, Tewksbury, and the following fish collected: 4,590 yearling and adult crappie or calico bass (5 to 15 in.) (3,200 planted in public waters, 1,340 sent to Stockwell Ponds for additions to the brood stock, and 50 to the South Boston Aquarium); 2,700 adult horned pout (10 to 15 in.) (2,650 planted in public waters and 50 to the South Boston Aquarium); 3,895 yearling and adult blue gills (4 to 9 in.) (3,820 planted in public waters and 75 sent to the South Boston Aquarium); 7 adult small-mouth black bass (10 to 16 in.) sent to the South Boston Aquarium.

From May 29 to June 4 Salvage Unit No. 1 operated at North Watuppa Pond, Fall River (water supply for Fall River). The following fish were collected and planted in local waters: 2,068 adult yellow perch (8 to 14 in.); 11,005 adult white perch (9 to 13 in.); 2,419 adult small-mouth black bass (8 to 22 in.); 2,476 adult horned pout (8 to 14 in.); 78 adult pickerel (15 to 27 in.); 31 adult pike perch (17 to 24 in.).

From June 2 to 14 Salvage Unit No. 2 operated at Ludlow Reservoir, Ludlow and Belchertown (water supply for Ludlow), and collected the following fish, which were planted in local waters: 740 adult small-mouth black bass (7 to 18 in.); 841 adult horned pout (7 to 14 in.); 1,365 yearling and adult yellow perch (6 to 14 in.); 37 adult pickerel (8 to 17 in.); 26 adult sunfish (6 to 7 in.).

From June 12 to 21 Salvage Unit No. 1 operated at Long Pond, Falmouth (water supply for the town of Falmouth) at the request of the town officials, who paid all expenses, and the following fish were collected and planted in ponds in Falmouth: 1,300 adult small-mouth black bass (8 to 16 in.); 825 adult yellow perch (8 to 13 in.).

From June 21 to 29 Salvage Unit No. 2 operated at Meeting House Pond, Westminster, and Wachusett Lake, Princeton and Westminster (water supplies for the city of Fitchburg) and collected from Meeting House Pond 75 adult small-mouth black bass (7 to 20 in.); and from Wachusett Lake, 200 yearling and adult pickerel (4 to 20 in.); 605 adult yellow perch (7 to 11 in.); and 195 adult horned pout (8 to 14 in.). All these were planted in local ponds.

From June 25 to July 2 Salvage Unit No. 1 operated at Great and Little Quitticas Ponds, Middleboro, Lakeville and Rochester (water supplies for the city of New Bedford) and collected the following fish, which were planted in local waters: 245 adult small-mouth black bass (12 to 21 in.); 130 adult



white perch (10 to 15 in.); 210 adult yellow perch (8 to 13 in.); 155 adult horned pout (8 to 13 in.); 56 adult pickerel (14 to 23 in.).

From July 10 to July 14 Salvage Unit No. 1 operated at Wenham Lake, Wenham and Beverly (water supply for Beverly and Salem) and collected the following fish, which were planted in local waters: 533 adult white perch (12 in.); 70 adult small-mouth black bass (14 to 19 in.); 35 adult pickerel (16 to 23 in.); 56 adult yellow perch (10 in.); 6 adult horned pout (12 in.).

From October 2 to October 8 Salvage Unit No. 1 operated at Crystal Lake, Wakefield (water supply for Wakefield) and collected the following fish, which (with the exception noted) were planted in Quannapowitt Lake, Wakefield: 966 adult small-mouth black bass (9 to 21 in.); 112 adult pickerel (10 to 24 in.); 1,370 adult horned pout (10 to 13 in.); 330 yearling and adult yellow perch (6 to 12 in.); 275 adult white perch (8 to 12 in.); 310 yearling and adult sunfish (4 to 9 in.). There were 34 adult small-mouth black bass (9 to 21 inches) collected and sent to the Palmer Fish Hatchery for addition to the brood stock.

From October 9 to 15 Salvage Unit No. 1 operated at Artichoke Basin, Newburyport and West Newbury (water supply for Newburyport) and collected the following fish, which were planted in local ponds: 315 adult pickerel (14 to 22 in.); 747 adult horned pout (8 to 11 in.); 957 adult white perch (8 to 10 in.); 110 adult small-mouth black bass (10 to 18 in.); 1 adult pike perch (24 in.).

The owners of the Oakes Ames Estate in North Easton drew down their pond, and permitted Salvage Unit No. 1 from November 9 to 11 to collect the following fish (in exchange for which the Ames Estate will receive stripped adult brook trout). The fish collected were planted in local waters, as follows: 2,300 yearlings and adult pickerel (8 to 20 in.); 1,000 yearling and adult horned pout (7 to 10 in.).

Several small salvage jobs were accomplished and the fish planted, in most cases, in local ponds, as follows:

From Cranberry Burrage Bog, Halifax, 425 fingerling ( $1\frac{1}{2}$  to 2 in.) and 425 yearling and adult blue gills (3 to 5 in.); 340 fingerling ( $1\frac{1}{2}$  to 2 in.) and 340 yearling and adult sunfish (3 to 5 in.); and 40 fingerling (3 to 4 in.) and 45 yearling and adult (8 to 14 in.) pickerel.

From Millers River, South Ashburnham, 3,000 yearling yellow perch (4 to 7 in.).

From Meeting House Pond, Westminster 123 adult small-mouth black bass (10 to 18 in.) were collected and turned over to the U. S. Bureau of Fisheries, and 96 adult small-mouth black bass (10 to 16 in.) were distributed to open waters.

From Meadowbrook Flowage Basin, Amesbury, 3,900 fingerling pickerel (4 in.); 650 yearling and adult white perch (4 to 12 in.); 4,200 yearling and adult yellow perch (4 to 10 in.); 30 adult crappie or calico bass (12 in.); 35 adult horned pout (6 to 12 in.); and 35 adult blue gills (6 to 8 in.).

From Norton Reservoir, Norton, 58 adult small-mouth black bass (12 to 20 in.); 75 fingerling pickerel (3 to 4 in.); 30 yearling pickerel (5 to 8 in.); 105 adult pickerel (8 to 15 in.); 35 fingerling yellow perch (3 to 4 in.); 105 adult yellow perch (6 to 10 in.); 37 yearling and adult horned pout (4 to 10 in.).

From Woods Pond, Prescott, 652 adult pickerel (8 to 20 in.); 1,622 adult horned pout (6 to 9 in.) were collected (which were held for a time at the Palmer Fish Hatchery and later distributed to public waters) in exchange for which Mr. Wood will receive yearling brook trout. From this pond also 200 adult horned pout (6 to 8 in.) were collected for addition to the brood stock in the Stockwell Ponds.

*Small-mouth Black Bass.*—The entire production of small-mouth black bass at the Palmer Fish Hatchery, 277,500 fry, 16,652 fingerlings and 10 adults, was planted in the following specially selected waters: Cliff Pond, Brewster; Lawrence Pond, Sandwich; Wakeby Lake, Mashpee; Lake Garfield, Monterey; Ashmere Lake, Hinsdale; Lake Buel, New Marlboro; Lake Gardner, Amesbury; Chebacco Lake, Essex and Hamilton; South or

Harris Pond, Methuen; Ashfield Pond or Great Pond, Ashfield; Hazzard Pond, Russell; Chapin Pond, Ludlow; Congamond Lakes, Southwick; Hampton Ponds, Westfield and Southampton; Arcadia Lake, Belchertown; Norwich Lake, Huntington; Goshen Reservoir, Goshen; Quannapowitt Lake, Wakefield; Lower Mystic Lake, Arlington; Peters or Mud Pond, Draeut; Long-Sought-For Pond, Westford; Farm Pond, Sherborn; Lake Pearl or Whittings Pond, Wrentham; Whitman Pond, East Weymouth; Stetson Pond, Pembroke; Mary's Pond, Rochester and Marion; Big and Little Island Ponds, Plymouth; West Pond, Plymouth; Billington Sea, Plymouth; Lake Lashaway or Furnace Pond, East Brookfield; Lake Chauncy, Westboro; Big Alum Pond, Sturbridge; Lake Wickaboag, West Brookfield; Monomonoek Lake, Winchendon; Long Pond, West Rutland.

Those bass taken in miscellaneous salvage jobs were planted in ponds near the locations where the fish were taken.

*Large-mouth Black Bass.*—The only distribution was two adults from the supply pond (which went first to the Eastern States Exposition).

*Horned Pout, Blue Gills, Pickerel, Yellow Perch, Crappie (Calico Bass).*—An unusually large stock of native pond fish was distributed from the Stockwell Ponds in addition to horned pout from the Palmer Hatchery, 1,000 yearling pickerel (4 to 8 in.) purchased from the League of Franklin County Sportsmen Clubs (produced in a pond leased by them) and the fish collected in the various salvage operations.

*Muskallonge.*—40,000 muskallonge fry were received from the New York Conservation Commission and planted in the Connecticut River at Montague.

*Alewife.*—The following depleted breeding grounds were stocked with adult alewives, collected in streams where they were running in good numbers: Lake Nippinicket, Bridgewater, 1,485; Town River above the Stanley fishway, Bridgewater, 250; West Monponsett Pond, Halifax, 905; East Monponsett Pond, Halifax, 670; Robbins Pond, East Bridgewater, 605.

*Fish Distribution to Public Waters, 1928*

	Product of State Hatcheries	Not Hatchery Product (Seining, gift, purchase, etc.)
Brook Trout:		
Fingerlings <sup>1</sup>	—	—
Yearlings (under 6 inches)	5,360	—
Yearlings (6 inches or over)	228,301	—
Adults	959	—
Brown Trout:		
Fingerlings	100	—
Yearlings	8,548	—
Adults	600	—
Rainbow Trout:		
Fingerlings	6,000	—
Adults	12	—
Steelhead Trout:		
Fry	14,500	—
Chinook Salmon:		
Fingerlings	4,900	—
Yearlings	221	—
Small-mouth Black Bass:		
Fry	277,500	—
Fingerlings	16,652	—
Yearlings and adults	10	6,079
Horned Pout:		
Fingerlings	22,300	—
Yearlings and adults	16,335	11,134
Yellow Perch:		
Fingerlings	12,800	35
Yearlings and adults	7,710	12,764
White Perch:		
Adults	—	32,550
Blue Gills:		
Fingerlings	215,750	425
Yearlings and adults	805	4,280

<sup>1</sup> 97,100 fingerlings were distributed as a by-product in the production of yearling stock.

*Fish Distribution to Public Waters, 1928—Continued*

	Product of State Hatcheries	Not Hatch- ery Product (Seining, gift, purchase, etc.)
Pickereel:		
Fingerlings	547	4,015
Yearlings and adults	3,105	4,965
Muskallonge:		
Fry	—	40,000
Crappie or Calico Bass:		
Fingerlings	87,100	—
Yearlings and adults	11	3,230
Sunfish:		
Fingerlings	—	340
Yearlings and adults	—	676
Alewives:		
Adults	—	3,915
Miscellaneous:		
Large-mouth Black Bass adults	2	—
Pike Perch adults	—	32
	930,128	124,440

*Fish Distributed to Clubs for Rearing to Larger Size before Liberation*

	Fingerlings	Yearlings
Brook Trout:		
Peabody Fish and Game Association	—	2,000
Haverhill Sportsmen's Club, Inc.	—	600
Orange Gun Club	—	1,000
Western Massachusetts Rod and Gun Club and Shelburne Falls Chapter		
I. W. L. of A.	—	1,000
Northfield Fish and Game Association	—	500
Westfield Chapter, I. W. L. of A.	—	2,000
Woronoco Rod and Gun Club	—	1,800
Concord Rod and Gun Club	5,000	—
Wrentham Sportsmen's Association	—	1,000
Plymouth Chapter, I. W. L. of A.	—	600
Clinton Fish and Game Protective Association	10,000	—
Worcester County Fish and Game Association	50,000	—
Fitchburg Chapter, I. W. L. of A.	7,000	600
Leominster Sportsmen's Association and		
Leominster Chapter, I. W. L. of A.	—	1,800
West Brookfield-Warren Chapter, I. W. L. of A.	—	500
Blue Gills:		
Clinton Fish and Game Protective Association	450	—
Worcester County Fish and Game Association	3,000	—
Crappie:		
Clinton Fish and Game Protective Association	50	—
Worcester County Fish and Game Association	2,000	—
Horned Pout:		
Worcester County Fish and Game Association	1,000	—
	78,500	13,400

## GAME DISTRIBUTION

*Pheasants.*—In December of 1927 and January, 1928, the beginning of the fiscal year, 386 pheasants (1927-hatched and classified at that time as adults) were distributed to 11 clubs and 5 individuals to be carried through the winter.

There were 12,711 eggs for hatching shipped to sportsmen's clubs and individuals. This year again we were unable, by several thousand, to supply the full number applied for. Those who received eggs hatched 5,280 young pheasants, of which 1,604 were liberated in open covers and 511 are being carried by them through the winter.

There were 318 young pheasants liberated (203 of these were sent to the clubs with the understanding that they were the club's allotment of wintered birds, and that if they wished to use them for field trials they might do so). This was the smallest number of young birds liberated in open cover in any year.



Of the approximately 250 clubs in the State, 95 (and 19 individuals) agreed to carry young pheasants from our game farms through the winter in pens for liberation as adult stock the following spring, and these clubs and individuals were furnished 5,884 birds for this purpose (60 of which were purchased from a dealer).

The local sportsmen's associations and chapters of the Izaak Walton League are rearing State birds and fish, and showing greater interest than ever before doing this work.

The process was begun of inspecting all quarters where pheasants are being held for us through the winter, and likewise the birds themselves after delivery. As time permits, all such quarters will be inspected to make certain that the stock is being properly cared for in quarters of sufficient size and under sanitary conditions.

There were 501 adult pheasants liberated (488 of these being discards from the brood stocks at the game farms and from the Ayer egg stock, and 13 purchased from a private dealer). All adult pheasants liberated were banded.

At the close of the year there are on hand at the four game farms 2,390 pheasants (1928-hatched) and 1,005 adults, for brood stock and spring liberation.

*White Hares.*—The Division was successful in importing this year from Maine, 1,984 white hares, a much larger number than ever before, of which 1,970 were liberated. (Of the 66 retained in one of the large brailing yards at the Wilbraham Game Farm for liberation after the close of the shooting season, 14 died). Before any white hares were distributed, every club was circularized to ascertain if their respective sections contained suitable cover, and shipments were made only to clubs indicating such.

*Cotton-tail Rabbits.*—Penikese Island yielded 295 cotton-tail rabbits, with a very good brood stock remaining on the island. At the present time the island is our only source of supply. These animals are shipped into sections where white hares are not present.

#### *Game distributed to the Covers, 1928*

	Product of State Hatcheries	Not Hatch- ery Product (Purchase, Gift, etc.)
Pheasants:		
Young (reared from the 12,711 eggs distributed for hatching) . . . . .	1,604	—
Young . . . . .	318	—
Adult . . . . .	488	13
Cotton-tail Rabbits:		
Adult . . . . .	295	—
White Hares:		
Adult . . . . .	—	1,970
	2,705	1,983

#### *Pheasants Distributed to Clubs and Individuals to be Reared to Adults for Spring Liberation*

	Product of State Hatcheries	Not Hatch- ery Product (Purchase, Gift, etc.)
Adults (1927 hatch) carried through the winter of 1927-8 . . . . .	386	—
Young (1928 hatch) to be carried through the winter of 1928-9 . . . . .	5,824	60
Young (1928 hatch) reared by clubs and individuals and carried through winter of 1928-9 . . . . .	511	—
	6,721	60

## MARINE FISHERIES

### GENERAL

The progress in the rehabilitation of the fisheries industry which was noted last year continues unabated. There has been reorganization of some of the larger units. A number of additional trawlers have been added to the fleet. These boats represent the most advanced ideas as to comforts of crews, speed to make possible short trips, radio communications with markets and sanitary conditions of handling which insures the highest quality of fresh fish. The scientists, the engineers and the practical men of the industry are making the most serious efforts to give the public a commodity that is in a perfect state of preservation, packed for immediate use without the past inconvenience of preparation and distributed over an increasing territory. The remotest districts in our country can now have fresh salt water fish products with as much ease as those located near our fish receiving ports.

Organization of the Massachusetts Fisheries Association is evidence that the men within the industry realize that in keeping with other industries, team work is essential to development. It also makes for sane and intelligent leadership and the standardization of trade practices so indispensable to any well ordered business.

We continue to express the hope that this splendid record will be increasingly recognized by the State and a larger measure of assistance will be given to this industry. In common with agriculture it is engaged in giving our people a balanced food ration. When once the food values of all sea products are more fully appreciated by the people of our country this industry will assume the position of great importance to which it is entitled.

Other industries may come and go, but by reason of our proximity to the fishing grounds this industry will be with us always. For this reason we should take great interest and pride in assisting its development wherever possible.

### INSPECTION OF FISH

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Sincerely we regret being obliged to record the demise on November 6 of Captain Jerry E. Cook of Gloucester, deputy inspector of fish. Captain Cook had been associated with us but a year and a half, and yet, in his passing, left with us all the indelible impress of a genial, capable public servant, a true son of the sea, one who daily gave evidence of real knowledge of the duties of his position, coupled with the kindly firmness necessary to carrying out understandingly the laws of the Commonwealth as applied to his duties.

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The work of inspection of fish was introduced under Governor Coolidge in 1919 and has been extensively followed ever since. In some of the early years it was deemed necessary in order that the people and the fish dealers might be fully acquainted with the work and the seriousness of the proposition which it sought to present, to go into print as widely as possible, and therefore some of the annual reports were of considerable length.

It is a pleasure therefore at this time, after nine years of intensive work, to find that the inspector of fish feels that the idea of quality fish is so well grounded in the minds of the fish dealers and the public alike that it is necessary to say but little more than to report the work of the office during the past year.

The inside work of the office has been along the same lines as laid down several years ago, namely to cover the greatest amount of retail stores the greatest number of times possible during the year and also to cover the great wholesale marts such as the Boston Fish Pier, Atlantic Avenue and Gloucester as frequently as possible and also all the other leading fishing ports of the State. This office has always set for its task that all retail stores should be covered three times in a year, while the wholesale places of Boston and



Gloucester above mentioned, should be looked over at least once daily, together with the catches of the vessels that land thereat.

As far as the retail stores are concerned it was found simply impossible to make a regular three-a-year-plan go over, but it can be safely said that 90% of the retail stores of the State are inspected three times during the year and some of them, where it was believed necessary, were subjected to more inspection during the year. It is not known of any store which has not received at least two visits from some inspector from this office during the year.

It is natural to suppose that this report is written for the information of the public and therefore it might be well to state that taken as a whole there is a splendid indication of a more general desire than ever noted before on the part of the retail dealers to keep their goods up to high quality condition.

For a long time the quality proposition has been sold to the wholesalers; indeed some of these firms vie with one another as to whose goods shall be even exceeding those of the others and yet all of them in the A 1 class.

From the above optimistic statements it is not to be inferred that some fish of unfit quality is not found in dealer's hands, when it is considered that with only three men something like 250 million pounds of fish have to be actually looked over in the run of the year and then that these fish have to go out to the retail stores afterward.

Outside of the regular work of the office the individual calls are innumerable and yet despite the fact that inspectors are practically working to the limit of regular assignments, an effort has been really made to meet each case intelligently. It might be said here that the activities of this office and the scope to which they could be widened are measured only by the size of the appropriation set apart for carrying on the work.

There are many specific instances of the value of this fish inspection work that might be quoted in this annual report that would actually appeal to the public and demonstrate the value of its work, but the inspector feels that the public and the dealers are both in such accord as to the worth of the work that little is necessary to be said.

We are pleased that our slogan of "quality fish only" has been successfully sold both to the fish dealers of the State and to every family that uses Massachusetts caught fish.

The following table shows some of the work accomplished during the year 1928:

Inspections in retail stores, 3,492.

Inspections in wholesale stores, 21,259.

Freezer inspections, 318.

Inspection of pedlar's carts, 205.

Inspection at Yarmouth, N. S., steamer, 235.

Vessel inspections at Gloucester, 282.

General inspection trips, 7.

Fish condemned at Boston Fish Pier from vessels, 43,065 pounds.

Fish condemned at Gloucester direct from vessels, 11 swordfish, 2,200 pounds.

Fish condemned at retail stores, 3,421 pounds.

Condemned at Boston Fish Pier from consignments on Yarmouth, N. S., steamer; graded as "jellied" 28 fish; 8,673 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 1,812 pounds fresh fish; 5,032 pounds lobsters.

Condemned, landed at Boston Fish Pier arrived by rail, 3,335 pounds.

Condemned, landed at Boston Fish Pier, direct, graded as "jellied" 64 fish; 15,269 pounds.

Total condemned at Boston Fish Pier, and at Boston from Canada by rail and steamer, 70,816 pounds.

Total inspections, 25,798.

Total fish condemned, 153,623 pounds.

Total court cases, 40.

\* Total convictions, 39.

\* One case pending.



## THE DEEP SEA FISHERIES

It seems to be almost becoming a habit to report increasing prosperity and larger catches for the off-shore vessels of the Massachusetts fleet and yet this year this is more particularly in evidence than for a long time; indeed it is doubtful if in all the history of the fisheries of the Old Bay State there ever was a year when the landings at all its ports fetched up to such a large total. And it is equally true that with the greatly increased number of trips, which means less time taken on the fishing grounds and therefore fish landed in better condition with the natural consequence of higher prices, that the largest money return was made to the fishermen and vessel owners on record. These statements are made, not only having in mind the record landing at the Boston Fish Pier, which broke all previous returns, but at Gloucester and also at the outlying ports, such as Provincetown, Woods Hole, New Bedford, etc. Indeed it might be called a fishing year par excellence.

While a decline in the catch of mackerel is noted and also a falling off in the catch of halibut, coupled with the not too disturbing fact that haddock reigned supreme over codfish as far as landings are concerned, it is interesting to note that the catch of swordfish was one of the largest on record, that the haddock return surpassed all previous figures, that the results of all other sorts of groundfishing, excepting halibut, showed an increase over the previous year, there is little left to worry about, with the possible exception of leaving in the minds of fishermen and dealers the need of a statistical survey which would set at rest the present day expressed fears that such inroads as are being made upon the haddock and flounder supply on the various banks may place these species in danger of, to say the least, disturbing diminution.

The halibut catch on the Atlantic banks admittedly is quite a bit less than last year and this with about the same number of vessels operating. Here also comes the question which has been brought up for several years as to whether some sort of conservation measure is necessary to preserve and perpetuate the fishery of this species, the catch of which for several years has been so slim as to place this fish in the luxury class. This statement is made having in mind the fact that on the Pacific coast, where the landings although now somewhat like fifteen times the total amount landed from the Atlantic banks, yet have shown such an alarming decline as to need by international agreement a close season of about three months which has been rigidly observed for two or three years, and it is claimed, with beneficial results, and which still continues in force.

The haddocking fleet which naturally makes its landing center at Boston produced a record year notwithstanding that the season opened in December of 1927 with very bad weather which brought high prices for the trips landed. Bad weather, in fact unusually bad weather, persisted during the whole month of December which made for very small catches and very high prices. The week ending December 23 produced the lightest landings for the whole year. With the opening of the New Year the weather moderated and trips increased in proportion with prices averaging fair, but towards the latter part of the month very severe weather again obtained which produced light receipts with the result of very high prices indeed, codfish ranging \$15 per hundred weight and haddock \$14.50. It is interesting to note during this period (the latter half of January) that in 1927 the weather was unusually mild, the receipts were unusually large and that a great many hundred thousand pounds of fish went to the splitters and smokers.

As a general proposition the weather continued bad during February, but fares were in generous proportion and prices high. So bad was the weather that in the latter part of February vessels ten days out from the Pier were able to set their trawls but two days on Georges. When they did set them they made good hauls and prospered on account of the high prices. In March good catches were made in South Channel and Georges and during this month the second largest receipts of the year were registered at the Boston Fish Bureau and prices reached their lowest level since the middle of

January. During the latter part of March, on one day 1,368,000 pounds of groundfish were taken out at the Fish Pier. This was the largest amount taken out for a long time in one day, the record being held on March 18, 1926, when 1,630,110 pounds were discharged. It is to be understood that these figures apply only to groundfish.

From this time on better weather obtained, the fleet was somewhat disseminated by some crafts entering the mackerel fishery and other lines of fishing, but it is worthy of note that the summer receipts at the Pier held up better than usual, that prices averaged higher than usual and that at all times there was a good call for fresh fish, due no doubt to the wonderful demand for fillets.

These increased landings at the Boston Fish Pier with the accompanying good prices had its material effect in decreasing the size of the fleet operating during the summer months on the eastern banks for capacity fares for splitting. These crafts, at the start of the season, found fish scattered and scarce and to obtain a paying voyage was almost out of the question. For this reason the eastern fleet was reduced in numbers and although during the latter part of the season the "school" fish were found in goodly numbers and many splendid trips made, yet the season to the eastward, notwithstanding that the prices were raised at least three times, could not be considered as a successful one in the light of the splendid prices with the quick trips from Georges and South Channel were meeting practically daily at the Boston Fish Pier.

The fresh halibut season was opened on January 7 by the sailing of the schooner *Catherine* from Gloucester. Previous to this, small lots of halibut had been brought in by the winter haddockers with sales quoted ex-vessel all the way from fifty cents to one dollar a pound. Of course these prices were for small lots. During March the halibut fleet landed some splendid trips and prospered accordingly, the prices fluctuating from fair to high and the vessels coming from St. Peters, Grand Bank and The Gulley. From this on there was a noticeable decline in the general size of trips landed, although now and then the season was punctuated by some exceptional fares. With the arrival of fresh bait quite a number of the fleet resumed operations on Georges and Brown's Bank, but as a general proposition the trips brought in from these grounds, although made in quick time and of the finest quality were small in size, while the vessels to the eastward seemed to fare better as a general proposition, although of course they took more time on their trips and their fares were of larger size generally speaking.

The gill netting fleet which centers its operations at Gloucester had a good year. During the winter of 1927 and 1928 catches were not very large, but prices to a certain extent compensated. During the time while the pollock school was on, all the crafts fared well. During the spring naturally there were only small hauls in which cod predominated. Some of the crafts continued to operate throughout the summer and as the fall and winter fleet numbered about fifteen sail, this was naturally reduced to a very few. However, with the opening of the fall season of 1928 the crafts in operation found fish in such goodly quantities and met with such splendid prices that others quickly followed into this line of fishing with the result that in December at least 20 or 25 boats were engaged profitably in this line of fishing.

The fleet fishing for flounders and which markets at Boston, Provincetown, Nantucket, Woods Hole, New Bedford and New York prospered well. Last year the total landings at these various mentioned ports by Massachusetts crafts alone totaled some twenty-two million pounds of this one delectable fish and it is felt that when the balance is struck for the year 1928 even this magnificent total will be exceeded. Naturally, there were times of glut when prices were at a minimum, but also by the same token there were opportune times when fortunate vessels found a bare market and profited exceedingly, but throughout the whole season as a general proposition it was a "profitable voyage" for all engaged in this industry. These crafts at the present time in pursuit of their calling cover the fishing grounds from



Thatcher's Island, along the coastal banks into Nantucket and Vineyard Sounds and on the outside along Nantucket Shoals and even onto Georges Bank in the vicinity of the Cultivator Shoal and other well known fishing spots in that vicinity. In other words the larger crafts fishing for flounders have at times in order to secure paying voyages to visit some of the most dangerous fishing spots known to the Atlantic coast, hence the danger of this particular line of fishing can be readily realized. This office has for two years been assisting the United States Bureau of Fisheries to the extent of collecting and collating statistics regarding the catch and landings of this flounder fleet, this being done to back up an expressed opinion that unless the matter of flounder fishing was carefully looked into by the experts of the United States Bureau we were in danger of depleting what at the present time is a wonderful marine resource.

The fleet of crafts which went to the Treaty coast of Newfoundland from Gloucester, to Bay of Islands and Bonne Bay during the fall and winter of 1927 and 1928 secured capacity cargoes of salted herring and some brought home fares during February of frozen herring from Fortune Bay, Newfoundland, there being at least three cargoes of the latter sort, these being landed mostly in Newfoundland bottoms, although it is commonly understood that the crafts were under American charter. This present fall, owing to the greatly increased demand for salted herring, the number of crafts engaged in this business was greatly increased. Herring were found in good abundance at Bay of Islands with the result that many and quick trips were made and this branch of the fishing industry gives evidence of only coming back more into its own, the same as of 15 to 20 years ago, when some 50 to 60 American vessels engaged in this most hazardous enterprise.

#### *Mackerel Fishery Pursued with Profit*

The mackerel fishery, pursued by the vessels of Massachusetts ports covering fishing grounds reaching from the Capes of Virginia to the Bay of Fundy, was pursued with profit during the spring, summer and fall season of 1928 and although the total catch failed by some fifty-five thousand barrels to reach that of the previous year, and was also one hundred and five thousand barrels short of the record year of 1926, yet by reason of splendid judgment used in marketing the catches there were very few times when a glut in the market became apparent and unusually low prices prevailed. Indeed so careful was the business end of the mackerel fisheries proposition worked out that although the public was not called upon to pay exorbitant prices at any time, yet a happy medium was maintained by reason of which vessel owners, captains and fishermen were quite adequately recompensed for their labors and the public in general was not overcharged for its goods. In other words, it has been figured out that notwithstanding the shortage of catch as compared with the previous year that those directly interested in the mackerel end of the fishing business did fully as well financially as in the previous year. It seemed to be simply a matter involving the proper business handling of one of the most interesting branches of the fisheries industry and it is the opinion of unbiased judges in the fisheries game that the selling and handling was properly looked out for, with due regard to both seller and consumer.

With due deference for the "darks" the fleet this year made a later getaway than last year, the first sailing being the schooner *Santina D.* which left Boston on April 2 from the port of Boston. The putting of her prow in the direction of southern waters was quickly followed by a large bunch of crafts from Gloucester and some from Boston and then the season could have said to have been fairly opened.

The first fare of the season was landed at Cape May by the schooner *Stiletto*, Captain Howard Toby, which ran in with 3,000 pounds of fresh mackerel caught 25 miles southeast of Winter Quarter Lightship, the sale at Cape May being at 35 cents a pound, the date of the arrival being April 12. The early report from the southern seiners was to the effect that the



weather had been bad and the sea unusually rough, which had greatly hampered seining operations.

The southern fleet, however, after the change of weather, fell into good fortune and many fine catches were made. But after a few days bad weather again set in and mitigated against the success of the fleet as a whole, so much so that when many of the fleet arrived home early in May to refit the southern record of catch was only 13 thousand barrels as against 41 thousand at the same time for the previous spring.

Very few vessels took a chance and went to the Nova Scotia cape shore and the general judgment of the fleet was borne out by the fact that as soon as good weather set in, catches in southern waters began to look up and such success did attend the operations of the fleet that by the middle of May vessels from the southern grounds were landing their fares in Boston from the grounds off Long Island and Block Island. The marked success, following the good weather which came in May, continued to such an extent that by June 1 the total landings of the fleet exceeded 45,000 barrels which was encouraging as compared with the blue outlook at the start. During this time the mackerel netting fleet to the southward had prospered also greatly, indeed it might be stated here that the schooner *B. T. Hillman* landed one trip of 33,000 pounds which is credited to be the largest fare ever landed by the mackerel netter.

The first arrivals in Boston from the Cape Shore came on June 6, the fares being taken off Sambro in the vicinity of Halifax. Along with these fares came the report that but very few vessels of the American fleet were fishing on the cape shore, the shore fleet continuing to land very fine fares, all the fish being taken in the waters contiguous to Block Island, No Man's Land, and Long Island, although some fish were showing between Cape Ann and Cape Cod and fairly decent hauls were being made. During the latter part of June some good fares were brought in and on Monday, June 18, the Boston Fish Pier had one of its largest mackerel days on record, when a total of 1,046,000 pounds of fresh mackerel were landed.

About this time small mackerel began showing, weighing about one-half pound each, in Cape Cod waters, but there later appeared to be no body to this school of fish. "Bull's-eye" mackerel, however, began to put in appearance in unusual quantities and this species of mackerel were found in abundance from Cape Cod to Long Island during the whole rest of the season. Owing to the fact that they are not highly regarded in the market they brought but small prices and often it became necessary for the vessels and traps to dump their catches overboard rather than take the time to run them to market.

Good catches prevailed throughout June, also the early part of July, although foggy weather and heavy seas were met with at times. Yet in spite of these handicaps the season progressed so satisfactorily that by the latter part of July the total catch of the fleet had reached the impressive figure of 150,000 barrels as compared with 185,000 barrels during the previous year. From that point on, however, foggy weather and other adverse elements prevailed against an increased catch and the landings of the fleet declined materially. Naturally there were spurts, but as a general proposition the catch of the fleet showed a noticeable falling off.

Some fish were found on Georges, but the main body of fish which had been apparent through July and August in South Channel and on Nan-tucket Shoals, and also Massachusetts Bay and some along towards Boon Island and the Maine coast, was not in evidence and the season which continued with more foggy weather sort of gradually petered out, although a large body of mackerel were reported on Georges Bank and so wild that it was almost impossible to make any paying catches. Into September the mackerel fleet were faced again by stormy weather and many who had been on Georges were forced to seek port. Squalls continued to hamper fishing operations and the vessels were in port most of the time, so that coming into October found the fleet making few or little hauls, and while some returned to the Block Island region in hopes of catching returning

schools of fish, they found but bull's-eye awaiting for them, which, as has been said before, had little standing in the market; this with the effect that by the latter part of October most of the mackerel seining fleet had given up operations, although some few still stuck to it and made a few hauls off Race Point, Cape Cod.

The mackerel netting fleet, which began operations with Gloucester as its base during the middle or latter part of October, had one of the most prosperous seasons in its history. The fleet, which was small at first, was greatly increased because of the success attending the vessels that went into the game early and before its close, about the middle of December, was increased to fully sixty crafts. These vessels fished from 25 to 35 miles southeast of Thatcher's Island and intercepted the schools from the Gulf of St. Lawrence on their annual return to southern waters, meeting with marked success and with the result that the small crews fared finely financially. Some very large fares were landed, as high as twenty and thirty thousand pounds being brought to port by a single craft and the unusual occurrence of mackerel in November and December being in such quantities that the wholesale fresh fish markets could not absorb them all and part of the fares had to go to the splitters at a fairly good price. This was witnessed on at least two occasions for the first time in the memory of the habitues of the wharves.

As stated above, the mackerel season while short in catch, was long on price and must have been satisfactory to all concerned in mackerel operations afloat and ashore.

The Massachusetts catches of fresh and salted mackerel from December 1, 1927, to November 30, 1928, inclusive, and for the corresponding period of the three previous years, were as follows:

	Dec. 1, 1927 to Nov. 30, 1928	Dec. 1, 1926 to Nov. 30, 1927	Dec. 1, 1925 to Nov. 30, 1926	Dec. 1, 1924 to Nov. 30, 1925
Salt Mackerel (Bbbs).	352	1,002	5,380	12,442
Fresh Mackerel (Bbbs.)	199,565	252,962	304,385	203,961
Total	199,917	253,964	309,765	216,403

*Cape Shore Catches of Mackerel for Eight Years*

Year	Arrivals	Fresh Mackerel (Pounds)	Salt Mackerel (Barrels)
1928	8	385,000	19
1927	3	155,000	3
1926	53	2,397,700	1,310
1925	34	1,545,000	1,075
1924	24	996,000	854
1923	31	1,240,680	211
1922	48	1,353,900	2,344
1921	29	2,160,000	3,003

*Improvement in Bluefish and Striped Bass Catch*

It seems fairly well indicated from reports all along Vineyard Sound and Buzzards Bay and also the inner side of the Cape as far up as and including Brewster, that bluefish and striped bass are slowly but surely returning to these waters in what can be considered profitable numbers. This report follows close upon the improvement noted, especially in the bluefish take of 1927, and from individual reports at many points along the waters indicated comes stories which are to say the least heartening to those to whom bluefishing and striped bass taking means so much, not only from a business but from a sporting angle. Warren A. Burgess who operates traps at Brewster and who last year made a splendid report of takes of nearly 16,000 pounds of bluefish and 3,386 pounds of striped bass for the season, writes



that in his opinion the striped bass are getting more plentiful every year and also that in his traps this year he took some bluefish that weighed from two to six pounds, although not as large a total catch as last year. This report should not be discouraging, however, for Mr. Burgess plainly states that there were more bluefish and striped bass taken in Vineyard Sound this year than last and that snapper blues were found in large quantities all along the coast. He looks upon this as a good sign that bluefish will be much more plentiful next year, although he admits that they are very shy and hard to take by handline.

Besides the reports of Mr. Burgess this office has also received from others who are greatly interested in bluefish and striped bass fishing reports which are most encouraging. In Buzzards Bay, for instance, there was a marked increase in the take of striped bass, especially in the traps, and advices from Buzzards Bay, which in former years was considered the home of the bluefish, comes the report that for the first time in twenty years large bluefish weighing from three to seven pounds had been taken in goodly sporting numbers on the hook. There are also reports of large hauls by sweep seines for striped bass being made in the Bay.

At Chatham, one correspondent tells us of a catch by sweep seine of over 2,200 pounds of striped bass at one haul, the fish weighing from 5 to 40 pounds each and marketing at thirty-two cents a pound in New York. It is also averred that in one day 12,000 pounds of these splendid fish were taken at Chatham and also that more were caught this fall than ever were caught before in a period of five years, which certainly is a most encouraging report.

For details as to the take of striped bass and bluefish the reader is referred to the various reports under Marthas Vineyard and Shore Fisheries. It can be said here, however, it is the consensus of opinion of the fish men and fishermen of the Cape and Islands that it seems now to be only a matter of time when bluefish and striped bass may once more be found in these waters in considerable abundance.

### *Cape Cod Activities*

It is very certain that the catch of fish in Cape Cod waters this year was much larger than last. It is also certain that while in some cases larger prices were obtained for some particular species, because of the scarcity in the market at the time of marketing was higher than the previous year, yet on the other hand some fish taken as a whole did not bring as much money as in 1927. However, there is no doubt that the Cape Cod catch this year exceeded in value by some appreciable amount of dollars what was paid out to the fishermen in 1927. For instance, last year while ten men fishing a string of ten traps shared about \$1,100 for the season, what could be considered as practically the same outfit, one crew of five shared \$1,000 while the other crew of five shared \$1,500. Outside of this is to be considered the very much larger catch with the traps which are placed in the freezers and which are marketed during this fall and coming winter season and also the increase of labor incurred by the additional and larger catch.

In addition to the good news contained in the above paragraph it must be considered also that weather conditions during the whole season were good for trapping, which means a very small loss of twine because of storms.

It is safe to say, and it is a good deal to say, and it can be safely asserted that the catch of the traps this year at Provincetown was 75% better than the previous year and also that the flounder fleet practically doubled the catch of the year before, or that at least it did, financially speaking, twice as well as it did the year before. Last spring the mackerel netters did unusually well and this fall some have already done fairly well. In all it is safe to say that the mackerel netting game can show a 50% increase over the year before. Very little codfishing was done this year and even at that the catches of the boats run 50% ahead of the year before. There was a most marked increase in the catch of whiting and this was particularly gratifying to not only the trap owners but to the people of Provincetown generally,



because it meant much more employment during the winter months. It seems hard to realize that where the year of 1927 was considered on the Cape as "fair," that this year at Provincetown the whiting catch was 200% above that of the year before.

The herring catch of this season and last were about the same. There was good fishing in the spring, but nothing after that and no fat summer herring were in evidence. "Sardines" were not so plentiful as the year before, in fact the catch was about half of that of 1927. Very few sharks were taken this year and horse mackerel or tuna were not in very liberal receipt. No striped bass were caught as far as known and no bluefish of any size. There were no large bluefish. The catch of mackerel was about 25% better than in 1927.

There was good spring fishing on butterfish and a few were taken all summer. It is estimated that the total catch was 25% better than 1927. As to squid, the same story as to the whiting catch applies, because the catch was at least 200% more than the previous year. It is safe to say that in the freezers there are plenty of squid to supply all the demand. The Provincetown experts note with a great deal of satisfaction that a lot more mackerel were schooling in Barnstable Bay this year than for quite a number of seasons, and that the catch in that splendid and almost perfect body of water practically doubled that of last year.

At Truro the traps doubled their catch of the previous year, while at Brewster they did not do as well; also the catch at Barnstable was not what would be considered satisfactory. The mackerel seiners this summer caught quite a lot of blueback herring which were sold for bait and found a very ready market. It is interesting to note that notwithstanding the large catches of mackerel it was not necessary to salt any trips at this port this season.

At Chatham the scallop season again was very poor indeed, it being practically impossible after the first few days for the fishermen to get their daily limit. On this account the fishery was abandoned by many and few continued to pursue it. During the year the traps in this vicinity did very well, especially when the squid started to run. Prices were very good on these for about three weeks, but later on it was almost useless to ship, as expenses could hardly be met on shipments. There was also a good run of whiting on which the trap men profited accordingly. The most noticeable feature of the fishing season at Chatham was the increase in the run of striped bass. These fish ran from two to forty pounds, and some truly wonderful catches were made. In one sweep of a sweep seine one crew took a ton of these splendid fish and the day's work for the same gang netted 6,000 pounds. As these fish bring a very fancy price in the New York market, somewhere around 30 to 35 cents a pound, the financial settlement gained by the delighted fishermen can easily be figured. It is stated by the fishermen that the striped bass catch here and in this vicinity was the largest for at least 25 years and that these splendid sporting and good eating fish are returning to the waters of the Cape is pleasing to record. There was also an increase, a gratifying one, in the take of bluefish, and it is interesting to note that over last year a marked increase in the size of these "blues" was very apparent, for some of the fish caught were of the size that the old timers still delight to tell about.

It seems to be the opinion of the fishermen, not only at Chatham, but all around the Cape that the lobster fishery is sinking a little each year. Certainly at Provincetown it was very poor. The men at Chatham may have made as much money as last year, but if so it was on account of the higher price, for they caught less lobsters.

At Yarmouth the fishermen report a larger catch of mackerel than last year and that the fish also brought higher prices, while the catch of butterfish, codfish and the take of sand eels was about the same as in 1927. At Yarmouth also the lobster catch was about the same as last year, but it is figured that higher prices were paid.

*Nantucket Fisheries*

While the flounder landings at this port were not as large as the previous year, which total again shows a decline from the year previous, yet it is the opinion of the captains that the flounder fishery taken as a whole and including the landings at all other Massachusetts ports and New York was as good, if not better, than the previous year. The fact is that where, several years ago, the great bulk of flounders were landed at Nantucket and shipped through to New York, nowadays crafts with full fares or large trips simply cease operations on the fishing grounds and make a straight wake for the New York market, there landing their fares direct, while the trips that come to the Island and are taken out are those which might be called part fares or broken trips or landings made expedient by weather conditions. Some of the captains seem to feel that the fishery was not as good this year, taken as a whole, as last year, but for the lack of actual statistics that opinion cannot be backed up by figures. The captains say that the weather as a whole was better than the year before, but that they did not seem to be able to find the fish. However, they aver that it came quite closely up to a standard year's work.

As to quahaugs, it is estimated that about 16,000 barrels were taken here during the year. About 22 boats fished on the off shore grounds and 15 confined their operations to the harbor bottom. This total is certainly not up to previous years and in the opinion of buyers and the fishermen themselves, there seems to be a gradual decrease in the supply and catch.

The scallop season, from what little can be learned at this writing, has opened very successfully, but it must be recalled that the fall and winter season of 1927 showed splendid fishing and that this fine opening of last year was followed by a marked diminution in catch, so much so that many of the boats engaged were forced to give up the fishery. It is hoped that this will not prove the case this year. There is very little to be said in regard to any other branches of the fisheries as they are not pursued to any large extent from this Island.

*Buzzards Bay Fisheries*

This year, as usual, the story of the fisheries catch in Buzzards Bay is one of marked interest, because of the fact that under state law the waters of the Bay are closed to certain methods of fishing. From the consensus of opinion of expert observers it would seem that gradually fisheries conditions in the Bay are improving, although this statement, based on the reports, is not considered of sufficient volume to as yet seek any change in the present regulations covering fisheries conditions therein.

There has been a good increase in the number of codfish taken in the Bay this fall and many of the smaller boats which have been fishing just off shore have been getting fair catches.

There has been little difference in the catch of flounders this year, although some of the fish traps along the shore have taken quite a few very small fish, which, while it could not be helped, of course is not considered conducive to conservative fisheries measures.

A good increase in the number of tautog taken both last spring and this fall is noted. This increase is credited to the new law which went in force this year prohibiting trawl fishing at the head of the Bay where these fish go every year to spawn.

About the usual run of mackerel has been noted in the Bay, although the very small fish which are usually seen in the fall, that is, the first year spawn, have not been seen in the usual number.

It is very gratifying to record that for the first time in twenty years bluefish of real sporting size have been taken on hook and line in the Bay. These fish ran from three to seven pounds and while they were not plentiful, they were taken in goodly numbers for some two weeks or more. As to "snapper" blues, or small sized fish, there was one of the largest runs New Bedford, South Dartmouth and Westport waters have seen for years. One could easily count from 100 to 150 people fishing at one time on the New Bedford



and Fairhaven bridge and also the same story fits for South Dartmouth for a period of nearly three weeks and the catches would run full forty fish per person. It was really quite a sight to witness, especially so where Buzzards Bay has been practically denuded of bluefish for a long term of years. At Hix Bridge on the Westport River there was also a heavy run of snapper bluefish.

Squeteague were taken on hook and line in the Bay this year, something that has not been heard of for ten years or so to any extent, the traps at Salters Point making a catch of 97 in one night. It will be remembered that last year was the first that any of these fish really came back into the Bay and then only a few were taken in the traps.

A fair increase in the catch of striped bass is noted in the traps this year. It is interesting to note here in passing that striped bass struck in all along the southern part of our coast from Buzzards Bay to Chatham.

For some reason the catch of butterfish in the traps was not as large as last year. There seemed to be spells when none of these were in the Bay at all, then there would be catches of quite a goodly amount and in a few days it would fall off again. For this no reason can be assigned.

A good increase in the catch of smelt is noted at South Dartmouth and Westport. The fish were actually seen to enter the Mill Pond at Russels Mills, South Dartmouth, this year, which is considered a good sign by the smelt fishermen.

The white perch catch was about the same as last year and large catches of whiting were made in all the traps along the Bay shore. The take of bass was about the same as last year and strangely at the opening of the lobster fishing season, a good number of these fish were also taken in the lobster pots. There is a large and gratifying increase in the catch of eels. As to squid, all of the fish traps in the Bay for at least a month during the summer made large catches, even the small traps getting from 15 to 20 barrels a day. This same story of the squid will apply to the take of "sardines" or small herring. The regular sized herring were a little late in starting their run into the Bay, but the catch was better than last year, so much so that the price dropped to one dollar a barrel in the middle of the season.

As Buzzards Bay is practically the greatest almost enclosed body of water within the confines of the Commonwealth and more legislation has been written around it than possibly any other body of state water, it is necessarily in the limelight. Therefore, it is only natural that the viewpoint of trained observers may differ somewhat in the opinions formed at the conclusion of a fisheries year. After careful conversation with many men from many ports of the Bay, it seems that beside the above statements the following very much epitomized story can be given and will be very interesting to those to whom the fisheries of this Bay are of first importance, always bearing in mind that this wonderful body of water is practically a pleasure ground for those who love to fish with hook and line.

*Squid*.—A large increase over last year, in fact twenty times as many as in 1927, but no summer squid.

*Bull's-eye mackerel*.—*tinkers*.—A very large increase, in fact in the opinion of many fishermen fully fifty times as many as 1927.

*Butterfish*. A good increase, with a steady run for the season and larger fish taken than last year.

*Lobsters*.—A big increase the first part of the year, but the crustaceans ran small. There was a big run in September of medium size, but a decrease in the catch of the large lobsters.

*Mackerel*.—Rather a poor year, only about one-fifth as many being taken. Six of the fish caught in the Bay as far as could be ascertained had rubber bands around their gills. The origin of the placing of these rubber bands is a mystery with all fisheries men and has never yet been solved.

*Flounders*.—There was a large increase in the take of "blackbacks" of large size and a decrease on small.

*Flukes*.—Ran in about the same proportion.



*Swordfish*.—About the same number were taken as last year and but for poor weather at inopportune times the catch would have been larger. Five jellied were taken about the middle of August and properly relegated from commercial consumption.

*Codfish*.—A great increase is noted over the last year, but the market was poor and the average size was better than in 1927.

*Haddock*.—Not as many were taken as in last year, but the fish ran larger as to size.

*Squeteague*.—Quite a decrease in number taken, but the fish were larger; perhaps 1,000 pounds in the whole season would cover the Bay's catch.

*Scup*.—There was quite a large drop in the catch of this year from that of 1927.

*Striped Bass*.—It is encouraging to report a large increase in the catch of these splendid fish the whole length of the Bay. It is cited that one who simply fished for pleasure, got over fifty fish. As these fish ran from two to forty pounds each, some idea of sport arising from the taking of the same can be readily imagined.

*Bluefish*.—There was a decrease of the catch of "blues" in this Bay, but to the eastward along the Cape Cod shore and down to Chatham the fishing for the same was very much better indeed. As far as could be ascertained six fish were caught off Woods Hole, which averaged  $3\frac{1}{2}$  pounds each.

*Menhaden*.—None were taken in the Bay this year; in fact these fish were reported very scarce all along our shore.

*Tautog*.—A very gratifying increase in the taking of this most edible fish is noted over the catch of 1927.

*Alewives*.—A marked increase over 1927 was noted, but as the market price was very poor very few of these fish were taken.

At New Bedford, from which a great many of the flounder dragging fleet sail and also where they are owned, but mostly landing their catches at New York, the report is of a decreased landing of fish than last year, although in some specific instances the catch of other species exceeded that of the previous season. This is believed to be true as regards swordfish and mackerel; of the former 1,074 fish were landed of an average of 200 pounds each, and 10 of these fish were found to be jellies and were promptly condemned and removed from all possibility of being used for human consumption. As to mackerel, there were 2,660 barrels landed at this port, which is also considered above the landings of 1927. These landings do not indicate by any means the full extent of what this market is capable of absorbing, but the fact is that during the latter part of the summer and fall the catches were mostly of bull's-eye mackerel for which there was little sale or demand and which simply meant a possible "breaking even" on the shipment and very little chance of any profit. Of these fish, landings at New Bedford could easily have been doubled as to quantity.

While the catch of fish in Buzzards Bay is rather small, even including that which comes from traps, it is well to remember that two important fishing ports of Massachusetts are located on the shores of this bay, namely Woods Hole and New Bedford, and that both are rapidly increasing in importance in this direction. It is unfortunate that we have no method by which the total catch at each port can be given, but it is safe to say that it runs well into the millions of pounds in both places, the catches being shipped to various nearby cities and the bulk to the New York and Boston markets. At Woods Hole much more fish was landed than the previous season, this being due to the fact that many larger crafts have landed their catches there. It can also be said that these larger landings met with a smaller financial total return than the previous year, because of the increased supply.

The Woods Hole report as to fisheries in the vicinity is from a commercial standpoint and therefore very interesting indeed. The dealers there report a larger increase in the take of striped bass than for at least twenty years, many especially large catches being made along the East Falmouth shore. The landings of mackerel ran short of last year's receipts, but as to bull's-eye mackerel it can be said that there were so many it was almost impossible

to make a shipment and get one's money back. Blackfish, or tautog, were quite plentiful during the summer, but the takes fell off during the fall. Bluefish seemed to have gone around to the other side of the Cape, as very few were found in this vicinity. The catch of swordfish ran about the same as last year.

A gratifying note in the report is to the effect that the lobster landings at this port and the fishery in this vicinity was exceptionally good but the lobsters ran smaller in size than usual.

There was an exceptionally good run of butterfish, the size being on the average much larger than last year, while the landings of scup were not up to that of 1927, but prices were very good at the beginning of the season. The catch of squid was very large. At the first of the season prices were very good, but towards the end it was almost impossible to make a shipment and get the money back. Scallops were very plentiful, in fact it can be called a most successful season and way ahead of last year and taking everything into consideration prices must be considered as good.

### *Martha's Vineyard*

Marthas Vineyard fisheries for the year show an increased catch over 1927 and also a better financial return. In connection with this also it is gratifying to record that certain fish which have not been very much in evidence for some time again put in appearance.

Inshore the floundering was from fair to good and prices were fairly high all the fall. Winter (tub) trawling was exceptionally good as the weather man was lenient and the fish ran fairly plentiful and of good size, being mostly codfish, with a few haddock mixed in. Scalloping last fall was spotty, but Edgartown and Nantucket both had a good season. Spring otter trawling was rather discouraging as to prices and there seems to be a growing tendency among those connected with the fishery to favor a closed season during the spawning period.

Trap fishing was only fair, the fish running not too plentiful either in the Bay or in the Sound; scup were scarce and when the mackerel came in the price was very low, due to the enormous catches made by the netters and seiners. Bull's-eye mackerel were a regular nuisance to the trap fishermen during the summer, they having to run hundreds of barrels of them over the top line daily, and let them go as there was absolutely no market for them.

There was a noticeable increase in the run of bluefish both as to the numbers and size. There was also a remarkable run of striped bass, with quite a few good hauls being made by sweep seines. These fish all run about six pounds each. Swordfish were fairly plentiful on the inshore grounds, the most being caught about twelve miles south southwest of No Man's Land. Sea scalloping was not carried on as extensively in this vicinity as the year before, only six boats being engaged as compared with fifty last year.

Lobstering was the best it has been in these waters for the past five years and the fishermen are unanimous in the belief that the purchase by the State of egg-bearing lobsters is the most constructive piece of legislation affecting the fisheries that has yet been enacted recently. However, time will tell how beneficial it is.

The handline fishing fleet have not had as prosperous a year as is general. There seemed to be plenty of scup and sea bass everywhere, but they did not seem to bunch up and bite as usual. There are about forty boats engaged in this line fishery in this vicinity and the movements of these fish means a great deal to the men who put the lines overboard. Flukes were scarce but ran to good size with prices holding steady at about ten to twelve cents a pound out of the boat.

The Vineyard boats this fall out in South Channel did some mighty fine work at dragging. The *Liberty*, in a twenty-minute drag, took her mast head off hoising in one batch. Winter floundering is on again now and fair returns are being made from the New York market, flounders of good size selling at times at \$20 a barrel in New York, although there are days when



through a flood of shipments the price of \$8 a barrel, which just barely meets shipment expenses, is met.

*Scup.*—Not as many as in 1927. Actually there were more fish here, but the school was always on the move and they were lost every two or three days. When the handliners struck the fish they caught plenty of them. One small boat with two men in the crew, handlining, brought in 1,000 pounds for one day's catch.

*Sea Bass.*—Quite plentiful, but not as many caught as last year. They ran much larger in size and most of the fish stayed around Muskeget, which is a bad place for small boats to fish and the fishermen had to pick certain days to go there.

*Tautog.* Tautog were about normal. Returns do not show much, as the best tautog market for this section is New Bedford and the market in New Bedford is crippled by the strike in the cotton mills. There are few, if any, shipped from here.

*Mackerel.*—Much more than last year and very much closer inshore than in many years. They are small sized, big mackerel being very scarce, but plenty of tinkers and bull's-eyes. The traps in the Sound took thousands of barrels of bull's-eyes, but found no market so they had to dump them.

*Squeteague.*—Not quite as plentiful as last year, but those caught ran better as to size than last year's catch.

*Bonito.* There were many more bonito than usual, but not many were caught. The largest bulk of the fish were sighted and seem to have stayed farther to the westward. There were plenty of these fish around Newport and Block Island.

*Summer Flukes.*—The catch was nowhere near normal in quantity. Otter trawling all summer was very poor, but those caught were of a very large size.

*Blackbacks.*—The blackbacks were late coming, but are very plentiful and are away ahead of last year in quantity. The fish run very small.

*Bluefish.*—Bluefish were more plentiful than for a great many years. There were more bluefish caught from the shores of the Vineyard than in thirty or more years. The commercial fishermen did not get a great many of them as they did not seem to trap well.

*Striped bass.*—The same may be said of striped bass as for bluefish. The catch was unusually large.

*Butterfish.*—These fish have run exceptionally well and were way ahead of last year in size. They ran mostly to mediums, trapped well and practically all of the traps in the Sound reported 50% of their catch were "butters." They were here unusually early and stayed late.

*Swordfish.*—Swordfish in local waters were more plentiful than for a great many years. Some were taken in Vineyard Sound. The fish as a rule ran quite close inshore and many were taken by lobster fishermen.

*Pollock.*—There were no pollock taken to speak of this year. There were few around, but when they were seen the weather was so bad that it did not pay to go after them.

*Codfish.*—Codfish were very plentiful. They came close inshore and more were taken last winter than ever in the history of the Island it is claimed. The indications now are that it will be even better this winter if the weather is right.

*Haddock.*—Very few taken locally, but in nearby waters the catch has been normal.

*Lobsters.* Lobsters are away ahead of anything in recent years, all the fishermen reporting a very successful season. The lobsters ran a month later than is usual. The fishermen had exceptionally good weather and did not lose any gear through storms, but did lose a lot of it through the activities of a squadron of United States destroyers who seemed to persist in running through their gear.

*Waste fish.*—There was a scarcity of waste fish. Plenty of dogfish, but they only stayed for a short period of time. Very few small sharks and very few skates. On the other hand more southern or tropical fish were taken



than for many years. There were some pompanos, barracuda, kingfish, spanish mackerel, flying fish, and tarpon. A lot of these were not fit to eat, especially the pompanos. There were not many squid, the usual run being way below normal, almost no menhaden and not as many whiting as common. Small bait such as sand eels, silver sides, etc., were never any thicker in years and they were thick all over, both in the Sound and outside, and quantities of very small blues, scup, pollock and mackerel were feeding on this bait and keeping well inshore.

The run of herring was about normal for the season, although not so many were taken as in other years, due to the fact that they were unable to do any fishing at the Mattakeesett Creeks.

The white perch fishing fell a little short, but was about as good as average. In a trap off Quissett a sulphur bottom whale about 20 feet long and 7 feet across the flukes was found one morning drowned in the trap. Also a twelve foot calf sperm whale came ashore on the south side of the Vineyard alive. These whales were presumably chasing schools of bait when they were trapped.

There were some sea-turtles seen near here which was not very common. From the Edgartown end of the Island there comes a very interesting report to the effect that yellow tails were taken in about the usual amount in this section during the winter months and so many vessels were fishing on this favorite spot in the vicinity of Muskeget Channel buoy that the school of fish was soon broken up.

Owing to the beach breaking through at the breeding pond just at the beginning of the season, no alewives were taken here this year; however, more spawned fish were noticed going out and also many more young fish than usual. The beach was closed May 9 and next season's fishing will probably be as good as usual. Very few large mackerel were taken here during the spring and most of the boats gave up netting. In September and the first part of October blinks, and bull's-eye mackerel weighing about one pound each, were very plentiful. As to swordfish, there were more sighted and taken in the inshore waters than for five or six years. Scup were rather plenty, but the market was so poor that few boats were fishing for them. Sea bass were reported more plentiful than usual, but no boats went after them.

Some bluefish were around this section nearly all summer and a few were caught off the shore in September weighing from five to eight pounds each, which indeed is very encouraging news. As to striped bass, there were more of these splendid fish in these waters than for the last fifty years. As an example of their plentitude it can be said that one man on November 4 caught twenty-one of them from the shore "heaving and hauling."

Clams are scarce and quahaugs are about as plentiful as usual, but not as many were taken on the average as so many of the boats were chartered by summer visitors for pleasure trips. Scallops were scarce in January, February and March, but there are rather more than usual this fall. On the whole the season at the Edgartown end of the whole Island has been rather better than the average of recent years.

### *Boston Fishing Activities*

It is once more a matter for congratulation that the port of Boston, the largest fresh fishing port in the western hemisphere, has again shown a remarkable increase in fish landings. Not only this, but it is to be especially noticed that more trips have been landed, which naturally means that the captains are making shorter trips, that is, are making their trips in fewer days, evidently impressed with the idea that landing newer fish means keeping up the quality standard and that keeping up the quality standard means a higher price for their goods. As is well known the fishing fleet of Boston is being largely increased; indeed it might be said at the present time at the close of the year 1928, after many splendid crafts have been launched in the past ten months, that the building ways at all available ports within hailing

distance of Boston seem to be entirely taken up with crafts in process of construction which will bear upon their sterns the hailing ports, not only of the Hub, but of other Massachusetts cities and towns. Indeed it can be safely said that the Boston fish business is certainly on "big time," with every week occupied.

The Boston fish story would be incomplete without an expression from Mr. Fred F. Dimick, Secretary of the Boston Fish Bureau, whose report is to be relied upon. Mr. Dimick says:

"The wholesale fresh fish business of Boston during the year 1928 has been good, and a large number of new steamers and vessels have been added to the fishing fleet. The receipts of fish at Boston direct from the fishing fleet for the seventh consecutive year shows an increase, an increase of more than one hundred per cent, a march of progress unparalleled in the annals of the fish trade. This increase has been largely due to the development of the business in filleted haddock. This business started in the year 1921 in a small way, but has steadily increased.

"The vessels engaged in the groundfish fishery have had a successful year. The schooner *Lark*, Captain Ernest Parsons, made an outstanding stock, probably the largest ever made in this fishery by a vessel. This vessel landed 5,553,162 pounds of fish and stocked \$174,477, each of the crew sharing \$3,650.

"A number of the large vessels have changed over recently from line trawling to dragging. In the operation of a dragger less men are required, and the fishermen make larger shares.

"In the spring of the year good catches of haddock were landed from the South Channel and South Shoal Lightship, but in the fall of the year fish were scarcer than they have been for a number of years. During the summer time all kinds of fishing operations were hampered by foggy weather. In the early fall the draggers made good catches of codfish on the Rips, the best for a number of years. The handline codfishermen as a rule landed light catches of fish and reported bait scarce on the grounds. They obtained good prices for their catch however, and had quite a successful season.

"The mackerel seiners did not land as many mackerel as the previous season, but had a successful season. The mackerel netters, in both the spring and fall, had the best season for a number of years.

"The swordfish vessels were successful on Georges Bank, but had poor success on Cape Shore. The catch of swordfish amounted to 16,152 fish, compared with 12,450 the previous year. The receipts from Canada at this port amounted to 2,387 fish, compared with 1,765 the previous year.

"The catch of fish in the Cape Cod traps was the best for four years. There was a good catch of butterfish, squid and whiting. The catch of herring, however, was light.

"Receipts of fish from Canada have been light, but in the case of swordfish and mackerel a little larger than the previous year. The receipts of fresh mackerel were 4,745 barrels, compared with 4,126 barrels the previous year.

"Salmon and halibut have been in good supply from the Pacific coast during the year 1928. Cars of swordfish, similar to the swordfish caught on the east coast, were received during the summer, and were in good demand. This is a business that promises to develop in the future. A small shipment of boneless filleted salmon were received from the west coast recently and effort is being made to introduce them in the east.

"The Atlantic coast halibut fleet was about the same size as the previous year. The first of the season some good catches of halibut were landed, but arrivals most of the season had light catches and reported fish scarce."



**RECEIPTS OF FRESH FISH AT BOSTON, DIRECT FROM THE  
FISHING FLEET, FROM DECEMBER 1, 1927 TO  
NOVEMBER 30, 1928**

	Pounds
Large Codfish . . . . .	24,426,905
Market Codfish . . . . .	15,406,558
Cod Scrod . . . . .	87,890
Haddock . . . . .	121,587,472
Haddock (scrod) . . . . .	12,143,585
Large Hake . . . . .	5,663,183
Small Hake . . . . .	73,000
Pollock . . . . .	2,954,785
Cusk . . . . .	1,560,014
Halibut . . . . .	3,286,376
Mackerel . . . . .	15,114,960
Swordfish . . . . .	2,263,437
Miscellaneous . . . . .	8,106,759
<b>Total . . . . .</b>	<b>212,674,924</b>

*The Gloucester Fisheries*

In keeping with the general progress of prosperity in the fisheries industry the port of Gloucester has not been omitted. While it would seem, from scanning cold figures, that the port is losing some of its old prestige, yet a close reading of the facts will show that this is not the case. At present, Gloucester is not able to secure landings at its own wharves sufficient to fill the needs of those who call upon it for fish. This, of course, is evident to one acquainted with fisheries conditions, but for the benefit of those who do not know we can say that the bulk of the fish landed by Gloucester vessels is taken out at the great port of Boston and at other ports along the coast as far down as Fulton Market, New York, and Cape May, New Jersey, and up to Portland. The table which accompanies this story will attempt in a way to show the facts as regards the amount of fish brought to Gloucester during the year.

A significant feature of the Gloucester report is that the amount of fresh fish brought in during the spring and summer months from the eastern banks and intended for salting, pickling and curing was a great deal less than for some time past.

At the same time, it is a most encouraging feature to learn that while there is a great increase in the demand for fresh fish in all the styles that it is now put out, that also the demand for salt fish has increased amazingly. It only goes to show that the public, once "sold" to fish of good quality, will continue to demand it, whether it is fresh, canned, salted, smoked, pickled, etc. To this basic fact is due the increased prosperity of Gloucester as a fish producing and shipping port.

The fish story of Gloucester for the year is one of prosperity as far as vessels and fishermen are concerned. Indeed it is doubtful if many years have equalled this one in proportion to the amount invested. While the business year as taken from the firm standpoint will admittedly gross larger than the previous one, yet based on the cost of production it is doubtful if the financial return will equal that of the previous year. Yet, however a fair-minded view of the situation would indicate a very prosperous year not only for the fishermen but for the dealers and shippers.

The following table gives the landings by American fishing vessels at Gloucester as reported by the United States Bureau of Fisheries from December 1, 1927, to November 30, 1928:



76		P.D. 25
Cod, fresh:		Pounds
Large	.	12,220,957
Market	.	2,589,100
Scrod	.	309,236
Cod, salted:		
Large	.	670,915
Market	.	151,071
Scrod	.	550
Haddock, fresh:		
Large	.	7,998,800
Scrod	.	648,600
Hake, fresh:		
Large	.	268,825
Small	.	2,355
Hake, salted:		
Large	.	1,875
Pollock, fresh	.	1,604,855
Pollock, salted	.	8,430
Cusk, fresh	.	280,795
Cusk, salted	.	5,605
Halibut, fresh	.	187
Halibut, salted	.	3,707
Mackerel, fresh	.	6,976,611
Mackerel, salted	.	115,910
Flounders, fresh	.	185,090
Swordfish, fresh	.	18,340
Herring, fresh	.	252,800
Other, fresh	.	1,218,102
Other, salted	.	3,170,496
Total, fresh	.	34,574,653
Total, salted	.	4,128,559
GRAND TOTAL	.	38,703,212

In reading this rather meager total it would be borne in mind that it contains no figures as to the amount of fish brought to this port by foreign crafts or by crafts from the Treaty coast of Newfoundland, or by vessels from the Maine coast with cured fish, and neither does it take notice of unregistered crafts of our own which are under five tons. If the amounts brought in by these various crafts should be added to this total it would be found that the amount of 56,494,846 pounds landed from all sources last year would in our opinion be considerably increased and to this end the following additional figures are offered:

	Pounds
United States unregistered crafts under 5 tons	5,000,000
Cured fish from Maine ports	2,000,000
Fish, not the product of American Fisheries, and also from Treaty coast	8,000,000
Fresh fish trucked to Gloucester from the Boston Fish Pier	9,000,000

Combining these latter figures with the United States Bureau of Fisheries' total will give a total of 63 million pounds, thus showing that actually instead of less fish being brought to the port of Gloucester than the previous year, there was actually an increase in the receipts of almost seven million pounds.

## SHORE FISHERIES

### General

While naturally not as productive in total amount of catch or value as could be wished, it must be understood that Massachusetts always takes a very strong interest in its shore fisheries and to that end it is the idea of this

office to make a full and complete report in order that the many small dealers and crews of small fishing craft will understand that the Commonwealth is as much interested in their fisheries welfare as that of the big vessels and trawlers that sail from Boston and Gloucester to the far-flung banks from the Hatteras Cape to Labrador.

It will appear to the reader that the story of the shore fisheries is a most interesting one as it touches the pulse of all the small places along our sea border line where even a dory is a source of supply and sustenance and maintenance of the family. For this reason we have devoted a considerable space to the fisheries story of the smaller places and let the tale of our two leading ports, Boston and Gloucester, appear under another heading.

From a careful survey of the reports that come to us, all of them from sources whose knowledge and authority is undoubted, it is apparent that the year has been one of increased productivity and increased financial returns to these hardy people who venture their all in the fishing game. There are especial features which later on in this report will be brought to the front, but the point it is desired to bring out and emphasize is that the fisheries industry as represented along the coast of the Commonwealth, far from being a declining one, is showing a most gratifying increase both from the financial and numerical standpoints.

Starting with the New Hampshire line and working down the coast it is noted that the catch of smelt through the ice during the winter months in the district from Salisbury to Marblehead was small, but to offset this, careful observers noted that when the fish came in to spawn in the spring, especially at Byfield flats on the Parker River and at Mill River in the town of Rowley, it was the largest run for years.

The lobster catch for the district is reported from reliable sources to be the largest for twenty years at least and this is accounted for by the throwing back of short lobsters and seeders. The dealers and lobstermen themselves believe that the law which was passed at the last session of the Legislature with reference to the payment for seed lobsters and the proper punching of the same was one of the best things the State has done to help the lobster situation for a long time.

The alewife run was very heavy in this district this spring in all of the streams. It is unfortunate to note that the eels being depleted in the Parker River in the town of Newbury was caused mainly by the fishing or spearing from boats. A town law has been passed against this. White perch ran into the Parker River in great numbers during the spring and summer and the fishermen had great luck in their catches, some taking as high as sixty pounds of these fish in a day. Where these fish came in is entirely salt water and no license is required to catch them and quite a number of fishermen came to this district to take advantage of this situation. It seems competent here to suggest the advisability of requiring a sporting license for the taking of smelt and white perch.

The clams are being depleted in the open areas because of the increase of regular diggers, also transient diggers because of the lure of high prices offered in the market. It is unfortunate to observe that the regular diggers do very little re-seeding and take the small clams as well as the large and give the flats no rest. On most of the contaminated shellfish areas in this district clams have come back in large quantities especially in Newburyport Harbor areas. When digging was allowed there were times when these flats were absolutely depleted, but now, with a little over two years' rest, these flats are simply alive with clams. Some clambers are fighting to save the flats from being depleted, but, on the other hand, there are others that take the attitude that the clams are always there, that they always will be and that he will get all he can of them, large or small, and tomorrow will take care of itself. The incorrectness of this attitude will be recognized by all.

Large numbers of bluebacks and sand eels were taken at the mouth of the Merrimack River this year and some of the boats reported good takes of cod, haddock, flounders and mackerel.

Swinging along into the district from Marblehead to Neponset it seems that



the lobster fishermen had a fair year and the prices have been good. The lobstermen in this district report a large number of small lobsters, in fact one old fisherman says he has seen the largest number of shorts this year than for the last twenty years. The herring fishermen had a good catch, somewhat above the average, while the codfishing was about the average of the past three or four years. Flounder fishing was fair and also a good catch of smelt was reported up to date.

As regards clams this area is practically considered contaminated, but plenty of clams are reported in the flats.

One significant feature on which considerable weight might be placed is the report of the large number of seals in Lynn Harbor. Some up as far as the Pines and Saugus River counted twenty-three in one herd in Lynn Harbor. It is only necessary to note here that the seals live on "school" fish and that they are commonly accounted as each consuming one to two barrels a day, to indicate their destructiveness to fish life.

It might be well from this report to consider a change in the law on the bounty of seals which now makes a man bring the whole pelt to the city or town clerk and receive therefor \$2.50. The original bill in this case called for \$10 per seal and even at this figure, allowing for a greater number to be killed than for the past five years, fisheries statistics would show the State and its fisheries to be the gainer.

There was a fairly good catch of crabs this year, but only a few were engaged in this business which is, however, increasing each year as the public seems to take to crabs in salads the same as it does lobsters.

From Quincy around to the mouth of the Cape Cod canal on the Bay side the story is that the mackerel fishery was not as good as last year, but that herring had been very plentiful along the South Shore and at the present time the various freezers are well supplied.

As to the lobster fishery, there was practically no spring fishing on account of bad weather. In some sections, because of the planting of small lobsters from seized under-sized Nova Scotia shipments at Brant Rock and vicinity, there has been a decided change in the industry and good results are being shown, so much so that the fishermen in this district have formed an association having for its object the protection of the short and seeded lobsters and indicating their desire not to deal in shorts. This idea, if adhered to, means the promise of a great deal better season for the next year.

In the spring of 1928 there was a good run of smelt to the spawning grounds, the fish making their appearance in three distinct heavy runs during the early part of March. Previous to this and after the heavy runs there was a scattering of fish in the smelt brooks and during the late summer months and up to the present time the smelt fishery has been very good all along the South Shore. It is improved to the extent that some men have found it profitable to catch these fish for market. In all sections along the South Shore the haddock and codfishing has been very poor and it is only now in the late fall that the codfish is coming within reach of the South Shore fishermen.

### *The North Shore*

The northeast corner of the State coastal waters, which are in the vicinity of Newburyport, show a positive dearth of fisheries activities and it can be said without doubt that fishing operations in this vicinity have reached the lowest ebb in their history and aside from the probability that the clamming industry may be restored to a limited number of clammers in Salisbury, Newburyport and Newbury who are now trying to eke out a living on restricted areas by the establishment of a larger municipal clam clarinating plant at Plum Island, things look bad.

A small experimental clam clarinating plant has been in operation there throughout the summer, and has demonstrated that it can be successfully operated and its treated product readily marketed. This plant was only able to handle a limited number of clams at each operation and but four diggers sufficed to keep it going at full capacity. The uncontaminated clam



flats are subject to intensive digging and the clams are becoming smaller and scarcer on them each year because of the excessive demands of the market. Certain flats have been closed by the towns of Newbury and Rowley to allow for necessary propagation and growth, but for very short periods. Several such areas when opened to public digging again were speedily and thoroughly dug up. So very avaricious are some of these clambers that they have dug by night and day or on both ebb tides and there has been a constant warfare and protest over encroaching clambers from adjoining towns. Each town is zealous of its right to control and regulate the clam fishery therein, but there is little practical worth-while work done to build up these depleted clam flats by the towns or its clambers. The continuance of such practice can but result in placing the livelihood of the clambers in a very precarious position. The highest prices yet received for clams has prevailed here this year and yet clambers report that they have not had a very prosperous season.

The few local lobster fishermen who tried to conduct that fishery report the poorest catch of any season yet and the loss of much gear by storms early in the height of the season.

The eel and sand-eel fishermen report plenty of fish, but a very poor market demand. Once again the winter handline fishing season for smelt at Mill, Rowley and Parker rivers was a dismal failure.

While there is an annual run of alewives in the Mill and Parker rivers, there is no leased development of this fishery and because of the lack of fishways on both streams the alewives cannot ascend to the ponds where they could spawn and reproduce.

Some striped bass were observed in Parker River during the spring and early summer, few being taken on hook and line. On one occasion the unusual sight of these large striped bass, as big as large pollock, was observed in spawning operations. There was a good run of white perch in both Mill and Parker rivers during the spring and many were taken by hook and line and sold in the local and Haverhill markets. An unusual report is to the effect that several large sized sturgeon were seen jumping out of the water in the Merrimack and Parker rivers this summer, but as far as known none have been taken.

Working along to the coast section from Cape Ann to Marblehead, inclusive, it can be said that the lobster fishery is no more than holding its own, even if it is doing that. Some 175 men are engaged in this pursuit with Gloucester and Rockport as the main centers of production. The early spring and summer fishing was very unsatisfactory owing to the inclement weather and a great scarcity of lobsters. After the shedding season, which occurs during late June and July, there was a noticeable increase in the number of lobsters taken and from that time up to the present the fishing has been very fair.

The lobstermen at Gloucester, realizing that the traffic in shorts has in the past and is at the present raising havoc with the industry, organized themselves into an association having for its object the better protection of the short and seeded lobsters and they have been living up to the law better this year than ever before. They practically all agree that the fall catch of lobsters was made up of shorts that they put back in the water during the spring and early summer and which have shed and become of market size and they claim that had they not done as they did there would have been practically nothing to catch during the late summer and fall.

Although the State appropriates money for the purchase of egg-bearing lobsters from the fishermen the local crowd requested that the Department furnish them with lobster punches, and they are punching the seeders as fast as they catch them and returning them to the water without asking any reimbursement. This not only saves the Commonwealth considerable money, but it also ensures of the lobster being returned to the water without delay or unnecessary handling and offers to it the maximum chance of reproducing under most favorable conditions and at the point of capture. It is a certainty that the lobster is not on the increase in this district and un-

doubtedly there is a gradual decrease in their numbers, and unless some constructive measures are adopted to improve conditions, it is only a question of how long the industry can survive or furnish a living for those engaged in it.

The trap fishermen in this section have had a fair year. Old England hake and butterfish, on which they depend greatly for their season's work, were very scarce for some unexplained reason, and the season's catch was made up mostly of mackerel and herring. The shore netters have also taken mackerel and herring in fair quantities and herring were especially plentiful along the shore and during the summer and up to the present time, the torchers taking them at will.

During the spring quite a fleet of small boats engaged in trawling along the shore. They did very well during the spring and many of these crafts, which, by the way, are manned only by one and sometimes two men, produce some very satisfactory weeks' work. This branch of the fishery is pursued mostly in Ipswich and Boston bays and on the Flat Ground off Rockport. Since the gill netters have been fishing at some distance off shore, the ground fish have shown a decided increase on the shore grounds and this has been a boon to the trawl class of fishermen whose gear is not heavy enough to work at any distance from the shore. It seems important to note here that while the gill netters have practically given up all operations in the coastal waters, the small otter trawlers or "draggers" as they are commonly called, have taken their place and the best posted fishermen feel there is no doubt but that history will repeat itself in a short time and these waters will be again cleaned of fish, as was the case following the intensive operations of the gill netters a few years ago.

The clam industry still continues to flourish in this district, but slowly and surely the natural supply is falling off. There has never been such a demand for clams as at the present time and also there has never been so many engaged in digging them and it does seem it will be only a question of time when as far as the flats of this district are concerned, the clam will be facing extinction.

Smelt fishing in this district has been very poor during the year.

The lobster fishermen in the Lynn and Marblehead district report the best catches for many years and this piece of good fortune was accompanied by good prices throughout the season.

#### *The South Shore*

The lobster fishing in and about Boston Harbor during the past season was very poor. About 18,000 under legal length lobsters were seized from Nova Scotia shipments and liberated from this port all the way from the New Hampshire line to the Rhode Island line. Lobster fishermen report, however, the catch of many egg-bearing lobsters during the season.

The smelt fishery in this district has been very poor and this report simply dovetails in with the smelt report from most of the other districts along the shore. It is certainly coming to the point where the smelt fishery should come under the head of a sporting activity and a sporting license for fishing therefor taken out, the natural proviso being that this Division of Fisheries and Game takes the fishery under its protecting wing and makes a serious effort to increase its productivity.

Clam taking in and about Boston Harbor is prohibited by strictures of the State Department of Public Health. Notwithstanding this, the diggers continue to violate this law, to try and enforce the provisions of which seven shore wardens are now working.

At Plymouth and vicinity there were good takes of clams in the open areas. On lobsters a fair season is reported, the catch of the fishermen being very good in July. One lobster fisherman reported that he had made more money in the month of July than he had made in any one month on lobsters for twenty years. There was a fair season on mackerel. A fair season is noted on codfish and haddock and there was a good catch of small herring early and also of large herring late in the season.



In the Fall River district about twenty boats fished for lobsters from Westport and their catch was from fair to good, so that the season can be taken as financially successful as it is known that good prices prevailed all through the season. Very little was done at Westport by the quahaug fishermen as these shellfish are not very plentiful.

In the district from Marion to Westport, catches of tautog and scup were the best in years and about the average on tinker mackerel and snapper blue fish. The bluefish ran larger this season than for many years, fish weighing three and four pounds each being caught in the vicinity of Great Hill in Marion and similar sportingly encouraging reports came from those who fished in Mattapoisett and Wareham waters.

Summary of the reports of the shore net and pound fisheries, as required by Section 148, Chapter 130, G. L., follows:

Number of men engaged, 119; number of boats, 81; value of boats, \$33,610.00; number of fish pounds, 51; value of fish pounds, \$39,985.00; number of nets, 356; value of nets, \$17,138.00; catch in pounds:

Alewives	52,656	Sea bass	1,256
Bluefish	4,539 $\frac{3}{4}$	Sea herring	330,865
Flounders	6,221	Shad	8,630
Mackerel	704,310 $\frac{3}{4}$	Squeteague	15,998
Menhaden	240	Striped bass	21
Pollock	5,769	Squid	1,394,285
Salmon	—	Tautog	32,583 $\frac{1}{2}$
Scup	27, 772 $\frac{1}{2}$	Other edible or bait species	1,446,545 $\frac{3}{4}$
Total pounds, 4,031,693 $\frac{1}{4}$ ; total value, \$106,826.15			

### *The Lobster Fishery*

The Legislature at its last session passed a law authorizing the Director to purchase egg-bearing lobsters at a price not above the wholesale market price for other lobsters.

This law is embodied in Chapter 263 of the Acts of 1928 and carried an appropriation of \$7,500 for the purchase of these lobsters. Under the terms of the law the fee of the lobster fishermen's license was raised to \$5, effective as of January 1, 1929, in order to provide funds for the operation of this law in the future.

The law became effective on July 25, 1928, and during the remainder of the fiscal year a total of 5,067 lobsters were purchased at a total expenditure of \$4,952.94.

The system used for this work was to have responsible lobster dealers throughout the State authorized to purchase egg-bearing lobsters from the lobstermen and hold them for sale to the Commonwealth. The coastal wardens periodically collect the egg-bearing lobsters from the dealers, mark them by punching a hole in the middle flipper of the tail as required by law, and then liberate them near where they were originally caught.

During the spring, from shipments from Nova Scotia, New Brunswick and other points outside the State, there were seized at Boston, 20 egg-bearing and 19,767 short live lobsters, all of which were distributed on favorable lobster locations along the whole State coast.

The totals of the tabulation of the returns of the year's fishing, required of the lobstermen by law, follow. The period covered is October 20, 1927, to October 20, 1928.

Number of men engaged in the fishery, 662; number of boats, 788; value of boats, \$202,116.85; number of pots used, 40,873; value of pots, \$113,763.80; number of lobsters taken, 1,199,190; pounds of lobsters, 1,788,774; value of lobsters, \$515,594.73; number of egg-bearing lobsters taken and returned to the waters, 10,958.

As required by Chapter 130, Section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1928 was 1,095.



## BOUNTIES ON SEALS

The following towns were reimbursed by the Commonwealth for bounties paid on seals under Chapter 130, General Laws, Section 155: Barnstable, \$14; Cohasset, \$6; Chatham, \$2; Duxbury, \$124; Eastham, \$8; Essex, \$20; Nahant, \$2; Gloucester, \$2; Winthrop, \$2; Ipswich, \$164; Kingston, \$34; Lynn, \$2; Sandwich, \$10; Newbury, \$6; Orleans, \$2; Plymouth, \$12; Rowley, \$2; Provincetown, \$4; Revere, \$4; Tisbury, \$2; Yarmouth, \$218; fees to treasurers, \$160; total, \$800.

## MOLLUSK FISHERIES

*Clam*

Records from the coastal wardens and information obtained from those engaged in the industry and from the diggers indicate that on the whole the season in most sections of the State where clams are found and allowed to be dug averaged as fair. The winter was very open and the weather favorable for fishery. A very fair set of young was reported for the summer of 1928. The beds at the present time in many sections are considered fair, but on the other hand there are almost as many depleted beds as those reported fair and several sections in which the areas are in extremely good condition. The market prices on the whole ranged about the same as in 1927, in fact the highest prices obtained do not anywhere go near as high as the highest obtained in 1927. The estimated total number of clams collected for the season, as far as can be learned, was about the same as in 1927. It may be remembered that there are at the present time a great many contaminated areas on which digging is prohibited.

*Oyster*

There are few districts in which oysters are collected and from these districts the season is reported as fair on the whole. The very open winter was favorable to the fishery, but no set of young for the summer of 1928 has been reported. The beds are all reported as in fair condition. The data collected on the industry indicates that production ranged about the same as in 1927 but the prices obtained were considerably lower this season.

*Quahaug*

A fair season was reported by those engaged in the quahaug business commercially. The very open winter was favorable to the fishery and a good set of young was reported for the summer of 1928, in most sections. The present condition of the quahaug beds is fair. The total production of quahaugs for the year 1928 was considerably less than in 1927 and the market prices ranged considerably higher.

*Scallop*

A good year was reported from those towns in which the best quahaug beds are located. The weather had no effect on the fishery because of the favorable open water and an extremely good set of young was reported for the summer of 1928 on the whole. The scallop beds are said to be in very fair condition.

The prices in most sections were lower than in 1927. The production was considerably higher than in 1927.

## ALEWIFE

Those wardens having alewife streams in their districts collected the usual statistics and history of the alewife fisheries operated during the year, and any unusual conditions pertaining to these fisheries was noted.

The restoration of alewife streams, more or less depleted, was pursued at various points and the breeding grounds were stocked with adult spawning fish collected from streams in which the fish were available in good numbers. (See Fish Distribution.)

Respectfully submitted,

WILLIAM C. ADAMS, *Director*

## APPENDIX

## RECOMMENDATIONS TO BE CONTAINED IN THE SIXTY-THIRD ANNUAL REPORT OF THE DIVISION OF FISHERIES AND GAME FOR THE YEAR 1928.

The Director respectfully recommends the passage of the following laws:

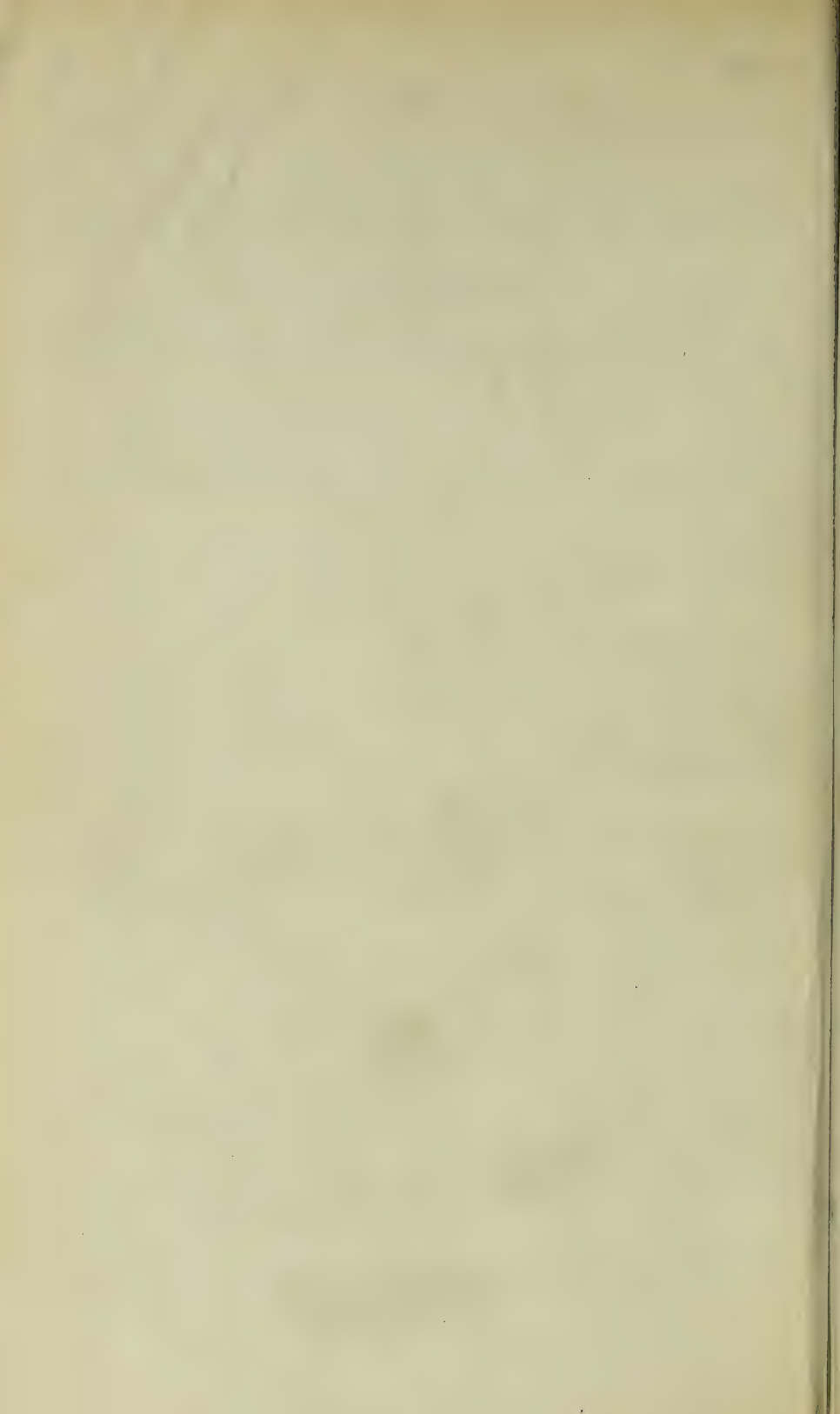
*Damage or Stealing of Property while Hunting, Trapping or Fishing.*—Many complaints are received of the wilful or negligent injury to property on the part of persons hunting or fishing. It is the desire of the Division to protect landowners against the depredations of persons who do not respect the privilege which they have of hunting and fishing on private property. To accomplish this the wardens should be empowered to arrest and prosecute any person whom they find destroying, stealing or injuring property. Our wardens spend the greater portion of their time in the back country regions, and we believe that they can be used as a valuable police force in the remote rural regions.

*Protection of Calico Bass and Crappie.*—These species have become well established in many of the inland waters of the State, due to the restocking program of this Division. We expect to continue our efforts to establish these fish in an additional number of our inland waters, and if they are to be maintained they must receive adequate protection, as the present law affords them no protection.

*To regulate the Importation of Game.*—The present law gives the Director the right to regulate the liberation of wild birds or animals. This was intended to prevent the liberation of sick or diseased species. Because of the prevalence of tularemia in certain sections of the country it is imperative that the importation of wild birds and quadrupeds be regulated in order that the Division may co-operate with the State Department of Public Health in its efforts to keep this malady out of Massachusetts. This legislation is the result of a conference of Public Health officials on this matter.

*Protection of Migratory Birds.*—Because migratory birds are under Federal jurisdiction they can be hunted only in accordance with Federal regulations. These regulations do not always conform with the State law, leading to much confusion on the part of the public and to many complications in the matter of law enforcement, as the Federal laws take precedence over the State Laws. It seems advisable to repeal the present open season on waterfowl and give to the Commissioner of Conservation the right to make rules and regulations for the taking of waterfowl within the Commonwealth, with the proviso that such rules and regulations shall at all times conform with the Federal regulations. In that way the Commissioner may from time to time amend the State regulations to bring them into conformity with the Federal regulations. At the present time legislative enactment is necessary to bring about this conformity every time the Federal regulations are changed and many times these changes are promulgated after the Legislature is prorogued. A similar law was passed at the last session of the Legislature, covering certain species of migratory birds, and this change will place all the migratory birds on a similar basis.

*Relative to Sporting and Trapping Licenses.*—The present law grants an exemption to the owners and lessees of agricultural lands on which they are domiciled from the requirements of the license law. It appears to be highly desirable to grant a similar exemption to the minor children of such persons who are under eighteen years of age. As practically all of the hunting and much of the fishing is done on private land, it is also advisable to change the existing law relative to the display of sporting and trapping licenses in order that the owners or lessees of lands on which hunting, trapping or fishing is done, or their agents, may require the display of the license of persons who are hunting, trapping or fishing on that land.





The Commonwealth of Massachusetts

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ANNUAL REPORT

OF THE

Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1929

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DEPARTMENT OF CONSERVATION



JUL 24 1930

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## The Commonwealth of Massachusetts

The Director of Fisheries and Game herewith presents the sixty-fourth annual report.

### GENERAL CONSIDERATIONS

It will be profitable to examine further all the elements which make up the "Relative Values" as applied to the cost of protection and propagation of wild life on the one hand, and the special privilege of the health giving recreation of pursuit and utilization of food on the other. A statement of the case from certain angles brings out some interesting situations.

We have a small State of approximately 8,200 square miles of inland waters and land. All of the wild life (excepting the migratory species) that moves over the surface or lives in the waters of this entire area belongs to all our people. With the formation of our State governments public ownership in the wild life was asserted. Except to pass scattering laws the State did little more than stake out its claim on the wild life, and rest. For generations it did practically no development work. It is interesting to note that Massachusetts did not make a start to provide a State agency to administer its wild life property until 1865. But at that, it has been a pioneer.

The entire water and land area (except natural great ponds of ten acres and upwards, our great rivers, and a minor percentage of land owned by the State), is owned by a relatively small group of our people known as the "land owners." They have the fundamental protection of law—that as against the public they may say who shall come on their land (and privately-owned waters) and for what purposes. While the land owners have from the beginning enjoyed this special protection—for many generations it was seldom invoked. It has only been within recent years that the land owners have begun to consider whether they should develop a



source of revenue by requiring the public to pay for the privilege of pursuing this State-owned property on their lands.

Thus we have the anomalous situation of a great mass of State-owned wild life property at large on privately-owned and controlled land and water.

While Massachusetts in 1865 took the first steps toward a businesslike administration of its wild life property—it has required the rapid developments of the past few years to bring home to the government the realization that ownership carries with it responsibilities and obligations as to administrative detail. We have come to understand fully that the protection and propagation of this stock calls for modern business methods. These involve not only protection through warden patrol and the artificial propagation of certain species—but also the preparation of the waters and the grounds to provide the proper biological environment for the stock at large and that which is to be released. Here the State comes up against an insuperable obstacle in carrying out the complete cycle of game administration—the State has no right to go on to private property to do these things without the owners' consent. The State may supply protection in so far as enforcing close season, bag limit and other regulations; it may artificially propagate fish, game birds and quadrupeds, but here it must stop for there is relatively little State-owned land on which the additional and equally important administrative details of vermin control and providing the proper environment can be carried out. In other words, the State will never be able to apply in their entirety the modern doctrines of game administration except on a relatively small part of the surface of the Commonwealth.

The State, through the Legislature, lays down certain rules under which all our people (including the land owners) may exploit this wild life, and defines the property rights which may be exercised in it when reduced to possession. But the State has no power to authorize the public generally in the pursuit of this State-owned property, to go on the lands or privately-owned waters without the land owners' consent.

Therefore, it is possible that on an extensive piece of privately-owned land and water may be found a sizeable volume of State-owned wild life property which the land owner, in various ways, may, for all practical purposes, appropriate to his own personal use or advantage. For example, he has the right to post his land and exclude the public for all purposes. He may elect to let the wild life live in peace; or, he may, subject to law, reduce it to possession and enjoy the economic value; or, give the exclusive privilege to his friends to come on to his property and exploit this wild life; or, sell these exclusive privileges to an individual or club, for his personal financial profit.

All this in the face of substantial expenditures by the State to protect (through the warden service) this State-owned property, and to increase its volume through propagation and distribution of large numbers of certain species. To put a single concrete case—a man may own a thousand acres of land particularly attractive to pheasants. Within a radius of two miles of this land a number of pheasants produced at the State game farms may be liberated. In time a good percentage of these birds may gravitate to the good pheasant cover on this thousand acres. They are State-owned birds. Nevertheless the owner of this area can appropriate this State-owned property to his own uses as indicated above.

The interesting question immediately arises—after all, what rights have the public in this State-owned wild life? The group of our people known as "nature lovers" (as distinguished from those who fish and hunt or trap) may observe it wherever the land owners consent. The group made up of the anglers, hunters and trappers may, subject to law, pursue and reduce to possession this wild life on such State-owned lands as are open for this purpose and on privately-owned waters and land where no objection is raised by the owners.

As to this latter group the laws provide that all who wish to hunt, fish or trap (other than certain groups of minors) shall purchase a sporting license from the State in order to exercise the special privilege. The underlying theory of the license is that all the people own the wild life, and those who would take some of it for their individual benefit or recreation should pay for the privilege. Land owners may hunt, fish or trap on their own lands without such license if they are domiciled on the land and it is used exclusively for agricultural purposes.

With the foregoing background in mind we are in a position to examine more closely the elements making up the "Relative Values" which our anglers, hunters and trappers receive from the purchase of a sporting or trapping license. While the possession of such license does not give him the right to go on privately-owned waters and lands to exercise the same, nevertheless the tolerant attitude of most of our land owners makes it possible for him to hunt and fish over vast stretches of the State without compensating the land owners for this privilege. The licensee pays no part of the cost of the taxes or up-keep or depreciation on this land—all of this burden falls on the land owners. To it should be added the hazards of injury to live stock, of fire, theft of property, and other items resulting from the misbehavior of certain of the public on private lands, which ranges from carelessness to downright viciousness.

While this opportunity to go on to private land free of charge is not a part of the consideration given him by the State in return for the purchase of a license, nevertheless he could not avail himself of this freedom of access to fish and hunt and trap, without having purchased a license. And this element must always be considered by the purchaser when appraising the value received when parting with his money for the license.

Another element (and which we consider to be the greatest of all) is the health-giving recreation of pursuit which the holder of a license may enjoy. Much could be said in enthusiastic terms of this value. But, after all, it depends on the mental and physical capacity of the individual and is something which cannot be measured in dollars and cents. It is sufficient to say, without fear of contradiction, that by the investment of no similar amount (no matter what the cost of the license may be) can the purchaser receive so large an opportunity for entertainment and recreation in any other way.

The final element lies in the actual commercial value of the wild life stock which the license holder is permitted to take. Most of it he cannot sell but may be utilized for food. In the case of the trapper his catch may be sold for cash. If we were to eliminate the other elements previously mentioned and regard the investment in a sporting license as a speculation in meat and pelts—it is a very inexperienced fisherman, hunter or trapper who cannot reduce to possession a sufficient amount of wild life to more than return to him, at market values for food stuffs, a cash equivalent to that paid for the license.

If the replacement value of stock taken is to be used as a basis (meaning the cost of returning an equal amount alive to the waters and covers) the figures are startling. For illustration—it would cost the trout fisherman a dollar a pound to purchase from a commercial fish hatchery and restore to the water, any trout taken by him in a season. A bass fisherman who captures a pound-and-a-half bass could not put another similar sized fish back into the waters alive through the purchase of such fish from any commercial breeder, for fish of that size are not available. Our common pond fishes have a fish market value of thirty-five cents a pound. Sizeable live fish of these species cannot be bought from any commercial breeders.

The hunter who kills a deer has a carcass worth thirty dollars, and it would cost upwards of one hundred dollars to purchase a live deer to release in the place of the one killed. If the hunter kills but one cock pheasant and nothing else under his license it would cost him at least twice the amount he now pays for his sporting license (\$2.25) to replace that bird



alive in the covers (or three times the amount if he attempted to purchase it and liberate it in the spring prior to the breeding season). Or, if he killed one ruffed grouse and no other game, it would cost him anywhere from five to seven times the license cost to return that bird alive to the covers—if there was anywhere in North America that he could purchase a bird. Or, if he killed but one quail, the cost of replacing the bird with an eastern-bred quail would be at least twice his license cost—again, providing he could find a commercial breeder with any in stock. Many additional statistics could be quoted to cover the remaining fields, as—the taking of a single pelt by a trapper of nearly all of our fur-bearing animals would yield him more cash return than the cost of a trapping license; but the above are sufficient.

The point of all the foregoing is—the sportsman today is not paying enough for the privileges or elements of value represented by a sporting license. *For generations he received something for nothing.* So long as he obeyed the limited number of game laws he could take the public property without protest and could make himself at home on private lands and waters with little objection from the owners.

In recent years he has been required by the State to pay a nominal amount for this privilege of taking public property. He is also more restricted for the State sees the necessity in order to administer its wild life property as a business proposition. Thanks to the tolerant attitude of the land owners he still gets something for nothing in that he is not required to pay to hunt, fish and trap on most private lands and waters. Today he is about as well off as formerly.

But can he continue in this status? We think not. The providing of the recreation of hunting and fishing and the occupation of trapping is slowly becoming recognized as a business. Some of the old timers will sigh and say that the sport has become commercialized. Call it anything you like—the fact remains that if we are to preserve and build up the volume of this kind of sport—we must pay for it. When the rank and file once get this idea clearly in mind, become willing to pay for the sport on a fair business basis comparable to that which they must pay for the enjoyment of any other recreation, and agree to provide the necessary warden (police) patrol to guarantee to the land owners security from improper treatment and financial loss by the thoughtless and vicious element—progress can be recorded.

#### PERSONNEL

There were no changes in the existing administrative personnel. Chapter 372, Acts of 1929 created the office of State Supervisor of Marine Fisheries, to which was appointed, dating from October 16, 1929, Mr. Zenas A. Howes of Wellfleet.

#### FINANCES

In order that those interested may follow the financial history of the Division we would point out that the fiscal year extends from December 1 of one year to November 30 of the year following. On or before October 15 of a given year the Director (through the Commissioner of Conservation) files with the Budget Commissioner a Forecast in which he sets forth the appropriations needed to finance the work for the coming fiscal year. Similar Forecasts are submitted by all departments to aid the Budget Commissioner in preparing the Budget in a preliminary way for final approval by His Excellency the Governor. The Legislature convenes on the first Wednesday in January. Within three weeks thereafter the Governor submits to it his Budget for financing the State's business during the then fiscal year. The Legislature refers the Governor's Budget to a Joint Ways and Means Committee, which conducts hearings and eventually reports the Budget back to the Legislature. When passed like any



other measure, and signed by the Governor, it becomes the law under which the State business is financed for the year. These several steps in the making of the Budget are generally completed by the middle of March.

From this it will be seen that several months of the fiscal year have elapsed before the Director knows what funds he will have to operate the Division for the fiscal year. From the time the fiscal year starts until the Budget is enacted into law the Director may expend sums for operating purposes on the same scale as in the preceding year. In this way the State business is not disrupted during the time the Budget is in the making.

Let us now return to the Forecast which was filed Oct. 15, 1928 in which was set forth what, in the Director's opinion, were the sums which should be appropriated for conducting the work in 1929. In this Forecast we continued our practice of several years past of dividing it into three parts, namely, "Part I,—Administration of the Central Office and the Propagation and Protection of Fresh-water Fish and Game"; "Part II,—Game Bird Reservations and Wild Life Sanctuaries"; and "Part III,—Marine Fisheries."

We concluded the section on Finances in our report for 1928 with a letter to the Budget Commissioner, dated Nov. 15, 1928, about one month after the Forecast had been filed, which was received while the State Budget was in the making. In it we showed that since the sporting license went into effect on January 1, 1926, \$45,266.43 of the revenues had not been appropriated for the direct benefit of those who paid in the money. We showed also that the estimated revenue from license fees, fines and miscellaneous revenue (Part I) for the fiscal year 1928, would be about \$253,677.54.

We have understood in recent years that the appropriation to finance the work represented in Part I of our Forecast (which covers the things we do of benefit to the anglers, hunters and trappers) is based largely on the revenues of the preceding year. We pointed out that for this year it would be only fair to receive an appropriation to finance Part I of our Forecast equal to the revenues of 1928 plus the arrears, which together amounted to \$298,943.97. We suggested a round sum of \$299,000 and submitted a memorandum for the consideration of the Budget Commissioner as to how such sum should be allocated over the several items included in Part I of the Forecast, in order to get the best results from our point of view.

The resulting appropriations and expenditures are tabulated as follows—

## APPROPRIATIONS AND EXPENDITURES, 1929

Budget Item		Appropriations	Expenditures	Balances
<i>Part I</i>				
256	Salary of the Director . . . . .	\$4,000	\$4,000.00	—
257	Office Assistants . . . . .	10,100	10,096.50	\$3.50
258	Office Expenses . . . . .	7,500	7,483.78	16.22
259	Education and Publicity . . . . .	1,000	923.93	76.07
	Enforcement of Laws:			
260	Personal Services . . . . .	67,600	67,105.22	494.78
261	Expenses . . . . .	34,520 <sup>1</sup>	31,981.57	2,538.43
	Biologist:			
262	Personal Services . . . . .	5,930 <sup>1</sup>	5,930.00	—
263	Expenses . . . . .	2,500	2,476.06	23.94
264	Propagation of Game Birds, etc. . . . .	100,000		
	Propagation of Game Birds, etc., (from the Governor's Fund for Extraordinary Expenses) . . . . .	3,500	103,454.55	45.45
265	Damages by Wild Deer and Wild Moose . . . . .	13,250	10,751.03	2,498.97
272	Improvements and Additions at Fish Hatcheries and Game Farms . . . . .	15,000	13,770.50	1,229.50 <sup>2</sup>
30-j	Codification of the Laws . . . . .	2,500	1,994.91	505.09
<i>Part II</i>				
266	Protection of Wild Life . . . . .	3,700	3,695.24	4.76
<i>Part III</i>				
	Marine Fisheries, Sale and Cold Storage of Fresh Food Fish:			
267	Personal Services . . . . .	11,100	10,567.85	532.15
268	Expenses . . . . .	3,600	3,470.35	129.65
	Enforcement of Shellfish Laws:			
269	Personal Services . . . . .	14,750	11,736.79	3,013.21
270	Expenses . . . . .	9,500	9,170.14	329.86
271	Purchase of Lobsters . . . . .	10,000	8,578.31	1,421.69
271-a	State Supervisor of Marine Fisheries . . . . .	5,000	3,608.11	1,391.89
273	Bounty on Seals . . . . .	800	675.00	125.00
		\$325,850	\$311,469.84	\$14,380.16
	Less amounts available for use in 1930 . . . . .			1,229.50 <sup>2</sup>
	Amount actually returned to the Treasury . . . . .			\$13,150.66
	Balance available from 1928 appropriation for Improvements and Additions at Fish Hatcheries and Game Farms, expended in 1929 . . . . .	\$2,393.69	\$2,384.26	\$9.43

<sup>1</sup> The original appropriations were changed to these amounts in the supplementary budget.<sup>2</sup> Available for use in 1930.

From the foregoing it will be seen that the total appropriation to cover Part I of our Forecast, amounting to \$267,400, is far short of our requests. Nevertheless it exceeded our revenues (Part I) for 1928 by \$14,528.52. It was His Excellency Governor Allen's first Budget. He was under no obligation to go back over the record and clean up these arrears. The fact that the appropriation exceeded the previous year's revenues by the above substantial amount shows that he appreciated the situation and the willingness of the anglers, hunters and trappers to help themselves.

It will also be observed that in listing the appropriations which are an offset to the revenues from last year, the item of \$13,250 to cover claims for damages done by wild deer is included. In past reports we have printed the arguments we have used with Commissioner Charles P. Howard of the Commission on Administration and Finance, and others, that these deer damage claims should be paid out of the general tax fund and not charged against the revenues from licenses, fines and miscellaneous income. On the other hand, in all fairness, we are willing to admit that there are strong arguments in favor of retaining this item in the appropriations made to cover Part I of our annual Forecast. For that reason we are abandoning any further discussion of this matter, particularly since His Excellency the Governor, in the appropriation



for this year and later by making available \$3,500 out of his fund for Extraordinary Expenses, provided total funds in excess of the revenues of last year more than sufficient to cover these claims.

The only item of appropriation recognizing Part II is Item 266—"Protection of Wild Life." In our Forecast we included under Part II the cost of operating the Heath Hen Reservation on Martha's Vineyard and the Penikese Island Sanctuary, believing that the maintenance of these two units is of more importance to the bird lovers and the general public than to the anglers, hunters and trappers. The heath hen for years could never be considered as a game bird or having potentialities, through increased numbers, to be ever regarded as such. Penikese Island was set aside primarily to protect the magnificent tern colony on it. While decoy ducks and geese have been maintained there to make it a way-station for water fowl on migration, and a colony of cottontails has been developed from which annually several hundred are shipped for restocking on the mainland, nevertheless it should properly be classified as a sanctuary and operated in the interest of all our people. The foregoing appropriation was not sufficient to pay the operating expenses of these two stations, with the result that the balance of the cost was charged to Item 264—"Propagation of Game Birds, etc." We are hopeful that in succeeding budgets this item will be increased to where there can be no further controversy on this point. In Part II we asked for appropriations to protect and develop other sanctuaries which have been deeded to the State in recent years, but no appropriation was made.

All the other items of appropriation were made in the interest of Part III, "Marine Fisheries," of our Forecast. It is a great satisfaction to note the presence of Item 271-a to finance the new section of Marine Fisheries (including shellfish) which was set up this year to be directed by a State Supervisor of Marine Fisheries (Chapter 372, Acts of 1929).

We trust that we have presented the financial set-up of the Division with sufficient clarity in the foregoing to settle, once and for all, the feeling on the part of certain sportsmen that a portion of the revenues from sporting licenses, fines and miscellaneous income is used to help finance the work of the Division in the interest of the marine fisheries. It should be apparent to all that no part of such revenue was so applied.

This year in presenting our Forecast for 1930 we divided it into three parts, as previously explained. We included items in the three parts greatly in excess of anticipated appropriations. We have followed this policy for some years. It is the result of a carefully thought-out plan that has two main purposes—(1) to make a fair revelation to the appropriating powers of what are the actual needs of the Division in order to supply the necessary protection and to carry on the propagation activities required if the Division is to keep pace with public demands; and (2) by revealing that need to the anglers, hunters and trappers while at the same time explaining that our appropriations in their interest are now largely based on revenues supplied by them, to encourage a larger annual contribution through an increase in the license fees. We believe that the present trend of affairs has justified the policy. The administration, from year to year, has been shown clearly what are the actual needs with a resulting tendency toward increasing the appropriations. A strong sentiment is rapidly developing throughout the State in favor of increasing the license fees.

Beginning this year we are grouping the revenue into three parts, corresponding to the three parts of the Forecast and appropriations. This year's revenues from Part I (licenses, fines from the inland warden force, and miscellaneous income) as shown in the table appearing elsewhere, is \$279,636.42.

If the appropriation (for Part I) for 1930 is to be on the same relative scale (with reference to the revenues for 1929) as the 1929 approp-



priations (for Part I) bore to the 1928 revenues for the corresponding part, it would be \$295,702. Proceeding on that assumption we sent to the Budget Commissioner, on November 22, the following communication:—

“November 22, 1929.

Carl A. Raymond, Esq.,  
Budget Commissioner,  
State House, Boston, Mass.

Dear Commissioner:

“The total of the revenues from sporting licenses, fines and miscellaneous income for 1928 which was the basis of the appropriation to cover Part I of our Forecast for 1929, was \$252,871.48. (See Note 1). The total appropriation for Part I for 1929 was \$267,400. (See Note 2). This shows that the appropriations (for Part I) exceeded the revenues (for Part I) by \$14,528.52.

“The rank and file of those who are contributing the revenues to make the major activities of this Division self-supporting deeply appreciate this action on the part of the government, in view of the fact that since the sporting license went into effect on January 1, 1926 about \$45,000 of the revenues produced were not appropriated for the benefit of those who paid in the money.

“The total revenues of the Division for 1929 from sporting licenses, fines (that part collected by the inland warden force is estimated), and miscellaneous income (Part I) to Nov. 15, amount to \$281,134.62 (See Note 3). Additional receipts between now and the close of the fiscal year will increase this total by at least one thousand dollars.

“We are advised that the report of the special commission to revise the game and inland fish laws will carry a recommendation for a substantial increase in the license fees. The anglers, hunters and trappers are lining up in favor of the increase. We hope that they will be encouraged, and that this plan will be supported by the Division receiving a proportionately substantial appropriation for 1930.

“Assuming that this will be done we estimate that the appropriation to cover Part I of the Forecast will be approximately \$297,500.\*

“For your consideration in making up the budget we enclose herewith a statement in which we have allocated over the items which will be grouped under Part I said sum of \$297,500. (See Note 4).

“*Part I.* The amount indicated (\$117,750) to cover the salaries and operating expenses of the wardens takes care of our existing force and the half year of service of one additional warden in place of the three suggested in the Forecast. We will have to replace at least twenty cars. The special commission may recommend compulsory uniforming of our wardens. We have included \$3,500 to take care of this item.

“We hope that the efforts of the special commission will result in the enactment of a new code—a desperate need of many years. In that event we should immediately publish the code. While we expect to sell copies at cost, it will require an initial expenditure (estimated at \$6,000) to make the printing.

“While the proposed appropriation for law enforcement is a substantial increase over this year, we have gone over the set-up very carefully and believe the amount indicated is conservative. We will be pleased to give you our complete analysis of the requirements on which this item is based, if you so desire.

“It will be noted that substantial increases come under the items ‘Propagation of Game Birds, etc.’ and ‘Specials.’

\* This amount was based on the estimated revenue for 1929, the actual amount not being known at the time of writing this letter. Refigured on the basis of the actual revenue, the amount would be \$295,702 as previously stated in this report.

"The enlargement of the production of our game farms and fish hatcheries and the other activities chargeable to this item cannot be financed out of appropriations of the size of the past two years—as witnessed by the necessity during the present year of transferring to this item \$3,500 from the Governor's Extraordinary Expense Account. To meet the growing demands our brood stocks of game birds and fish should be enlarged and our output greatly increased. A large amount of equipment should be supplied in order to get the greatest economies of operation.

"This item will be further called on next year to carry the salary of the 'Supervisor of Claims, etc.' which we have asked authorization to establish as of June 1 next; also the salaries and operating expenses of three new positions (vermin control agents).

"Each year we should supplement the output from our own plants by the purchases of additional stock, as, for example, pheasants, Bob White quail, cotton-tail rabbits and rainbow trout. We should establish a number of colonies of our own native cotton-tails. Our experience on Penikese Island shows this can be done.

"The appropriations under the item 'Specials' over the past years have been totally inadequate to meet the development of our game farms and fish hatcheries and the purchase of additional lands to enlarge these units, establish additional rearing stations for trout, and pond cultural units for the production of our common pond fishes.

"We should purchase the five tracts of land which at present we are carrying under lease, with options of purchase at prices named in the leases, aggregating \$7,635. On these we are paying annual rentals of from six to ten percent of the purchase price. We should purchase additional areas to protect our watersheds, and to supply the necessary land for our game farms. The farms should be large enough to permit resting a part of each year as a safeguard against disease. No one of our fish hatcheries and game farms is now fully developed. The life of the wire netting on the pens on our game farms is good for only ten to twelve years. Most of it must now be replaced. Many wooden dams at the hatcheries are rotted out and must be replaced with concrete.

"As to Parts II and III, we offer the following suggestions.

"*Part II.* The item of 'Protection of Wild Life' should be so increased as to take care of the full operating costs of the Heath Hen Reservation on Martha's Vineyard and the Penikese Island Wild Life Sanctuary; and to make a start on protecting and developing the sanctuaries which have been deeded to the State in recent years. The maintenance of a chain of such sanctuaries across the State, each of substantial size and well administered (including the exclusion of poachers, the destruction of vermin, and development of food supplies) is the surest guarantee of the maintenance of a desirable wild life stock. Our people will be encouraged to give generously of land and funds to this end if we begin development of the areas already received.

"*Part III.* From year to year we have urged some recognition of the Marine Fisheries (including shellfish) through appropriations to enable the Division to be of genuine usefulness to this great industry. We take this opportunity to recognize and thank you for your splendid contribution in making possible this year, the establishment of the office of State Supervisor of Marine Fisheries and the initial appropriation to set it going.

"We believe you thoroughly understand our objectives in the administration of this new office and feel certain that you will suggest an appropriation which will permit it to function efficiently.

Very truly yours,

WILLIAM C. ADAMS, *Director.*"

P.S. Since dictating the above we have received the bids for fish



food for the next fiscal year. Where this year we paid 4c a pound for hog melts—the lowest bid for the coming year is 4.57c per pound. This year we will have used over 200,000 pounds. Next year our requirements will be more.

(The enclosures to the above letter, follow.)

*Note 1—1928 Revenue Analyzed*

	<i>Part I</i> Anglers, Hunters and Trappers	<i>Part II</i> Non-game Birds	<i>Part III</i> Marine Fisheries
<i>Part I</i>			
Sporting and trapping license fees . . . . .	\$241,870 00		
Payments to balance unsettled license accounts of previous years . . . . .	37 70		
Rent, sales, etc., at stations . . . . .	507 00		
Sale of shiner permits . . . . .	305 00		
Sale of game tags . . . . .	25 10		
Sale of confiscated goods . . . . .	85 79		
Sale of miscellaneous goods . . . . .	22 94		
Fines turned into the State Treasury from county treasuries as a result of fish and game law violations . . . . .	10,017 95		
<i>Part II</i>			
Nothing . . . . .		Nothing	
<i>Part III</i>			
Lobster license fees . . . . .			\$930 75
Sale of lobster meat permits . . . . .			380 00
Lease of clam flats . . . . .			15 00
Total revenue, \$254,197 23 . . . . .	\$252,871 48	Nothing	\$1,325 75

*Note 2—1929 Appropriation Analyzed*

	<i>Part I</i> Anglers, hunters and trappers	<i>Part II</i> Non-Game Birds	<i>Part III</i> Marine Fisheries
Salary of Director (Item 256) . . . . .	\$4,000		
Office Assistants (Item 257) . . . . .	10,100		
Expenses (Item 258) . . . . .	7,500		
Exhibitions (Item 259) . . . . .	1,000		
Enforcement of Laws:			
Personal services (Item 260) . . . . .	67,600		
Expenses (Item 261) . . . . .	34,520 <sup>1</sup>		
Biologists:			
Personal services (Item 262) . . . . .	5,930 <sup>1</sup>		
Expenses (Item 263) . . . . .	2,500		
Propagation (Item 264) . . . . .	103,500 <sup>2</sup>		
Damages by wild deer and wild moose (Item 265) . . . . .	13,250		
Improvements and additions at fish hatcheries and game farms (Item 272) . . . . .	15,000 <sup>1</sup>		
Codification of Laws (Item 30-j) . . . . .	2,500 <sup>3</sup>		
Protection of Wild Life (Item 266) . . . . .		\$3,700	
Marine Fisheries; Sale and Cold Storage, etc.:			
Personal Services (Item 267) . . . . .			\$11,100
Expenses (Item 268) . . . . .			3,600
Enforcement of Shellfish Laws:			
Personal services (Item 269) . . . . .			14,750 <sup>4</sup>
Expenses (Item 270) . . . . .			9,500 <sup>4</sup>
Purchase of lobsters (Item 271) . . . . .			10,000
Bounty on seals (Item 273) . . . . .			800
Salary and expenses of State Supervisor of Marine Fisheries (Item 271-a) . . . . .			5,000
Total appropriation, \$325,850 . . . . .	\$267,400	\$3,700	\$54,750

<sup>1</sup> The original appropriations were changed to these amounts in the supplementary budget.

<sup>2</sup> The appropriation was \$100,000, and to this was added \$3,500 by order of His Excellency the Governor from his fund for Extraordinary Expenses.

<sup>3</sup> Not a fish and game appropriation, but under the Legislative Department.

<sup>4</sup> Part in main and part in supplementary budget.



Note 3—1929 Revenue<sup>2</sup> (to November 15)—11½ Months

	Part I Anglers, Hunters and Trappers	Part II Non-Game Birds	Part III Marine Fisheries
<i>Part I</i>			
Sporting and trapping license fees . . . . .	\$267,830.00		
Rent, sales, etc., at stations . . . . .	302.00		
Sale of shiner permits . . . . .	290.00		
Sale of game tags . . . . .	51.95		
Sale of confiscated goods . . . . .	104.47		
Sale of miscellaneous goods . . . . .	2.00		
Fines turned into the State Treasury from county treasuries as a result of fish and game law violations . . . . .	12,554.20 <sup>1</sup>		
<i>Part II</i>			
Nothing . . . . .		Nothing	
<i>Part III</i>			
Lobster license fees . . . . .			\$4,836.70
Sale of lobster meat permits . . . . .			360.00
Sale of lobster rules . . . . .			43.00
Lease of clam flats . . . . .			—
Fines turned into the State Treasury from county treasuries as a result of fish and game law violations . . . . .			3,300.00 <sup>1</sup>
Total revenue (11½ mos.), \$289,674.32 . . . . .	\$281,134.62	Nothing	\$8,539.70

<sup>1</sup> The total of the fines shown in Part I and Part III are actual receipts as shown on the Comptroller's books, from Dec. 1 to Nov. 13, 1929. The division of the total amount between the inland warden force and the coastal warden force is estimated in this office.

<sup>2</sup> This represented the best estimate possible at the time of writing the letter to the Budget Commissioner, before the fiscal year was completed. The revenue table in complete and final form is to be found in the section on Revenue, following.

## Note 4—Allocation of Appropriation (Part I) for 1930

Salary of Director . . . . .	\$4,500
Office assistants . . . . .	10,640
Office expenses . . . . .	7,500
Exhibitions . . . . .	1,000
Enforcement of Laws:	
Personal services	
Expenses . . . . .	117,750
(Including one additional warden)	
Biologist:	
Personal services . . . . .	7,830
Expenses . . . . .	3,000
Propagation, etc. . . . .	112,000
Damages by wild deer and wild moose . . . . .	11,000
Specials (New Construction) . . . . .	22,000
	\$297,220

## REVENUE

The revenue turned into the State Treasury for the period of the fiscal year (divided into three parts corresponding to the three parts of the Forecast), was:—

	<i>Part I</i> Produced by the hunters, anglers and trappers	<i>Part II</i> Produced by those who en- joy wild life but do not hunt, fish or trap	<i>Part III</i> Produced by the marine fisheries
<i>Part I</i>			
Sporting and trapping license fees . . . . .	\$268,941.00		
Rent, sales, etc., at stations . . . . .	314.00		
Sale of shiner permits . . . . .	310.00		
Sale of game tags . . . . .	51.95		
Sale of confiscated goods . . . . .	104.47		
Sale of miscellaneous goods . . . . .	2.00		
Fines turned into the State Treasury from county treasuries as a result of fish and game law violations . . . . .	9,913.00		
<i>Part II</i>			
Nothing . . . . .		Nothing	
<i>Part III</i>			
Lobster license fees . . . . .			\$4,836.70
Sale of lobster meat permits . . . . .			360.00
Sale of lobster rules . . . . .			43.00
Lease of clam flats . . . . .			—
Fines turned into the State Treasury from county treasuries as a result of fish and game law violations . . . . .			6,251.20
Total revenue, \$291,127.32 . . . . .	\$279,636.42	Nothing	\$11,490.90

*Detail of receipts from Sporting, Trapping and Lobster Licenses*

KIND	Total Number Issued	Gross Value	Fees to Clerks	Net Return to State
Resident Sporting (\$2.25) . . . . .	118,014	\$265,531.50	\$29,503.50	\$236,028.00
Resident Trapping (\$2.25) . . . . .	4,650	10,462.50	1,162.50	9,300.00
Non-resident Sporting (\$5.25) . . . . .	2,517	13,214.25	629.25	12,585.00
Non-resident Trapping (\$5.25) . . . . .	47	246.75	11.75	235.00
Non-resident Sporting (\$2.25) . . . . .	598	1,345.50	149.50	1,196.00
Non-resident Trapping (\$2.25) . . . . .	23	51.75	5.75	46.00
Alien Sporting (\$15.25) . . . . .	347	5,291.75	86.75	5,205.00
Alien Trapping (\$15.25) . . . . .	15	228.75	3.75	225.00
Minor Trapping (\$0.75) . . . . .	6,673	5,004.75	1,668.25	3,336.50
Duplicate Licenses (\$0.50) . . . . .	1,569	784.50	—	784.50
	134,453	\$302,162.00	\$33,221.00	\$268,941.00
Lobster (\$1.00)* . . . . .	30	30.00	4.50	25.50
Lobster (\$5.00) . . . . .	992	4,960.00	148.80	4,811.20

\* The fee for a lobster license was changed to \$5, to take effect on January 1, 1929.

## CONFERENCES WITHIN THE STATE

The regular annual conference with the anglers, hunters, trappers, and those interested generally in wild life, was dispensed with, for the reason that the special commission to revise the game and inland fish laws held a number of public hearings in various parts of the State, during the fall. The Division was represented on the commission, and at the hearings most of the matters were discussed which would otherwise have been considered at the annual conference. On account of the activities of the said commission the Director submitted no propositions to the local fish and game clubs and chapters of the Izaak Walton League, to be the subject-matter of recommendations to the Legislature.

## ACTIVITIES OUTSIDE THE STATE

The Director attended meetings having to do with all phases of wild life conservation, as follows:

The annual meeting on December 3 and 4, 1928 in New York City of the National Game Conference, under the auspices of the American Game Protective Association.

The annual meeting on December 6, 1928 in Washington, D. C. of the Advisory Board to the United States Biological Survey, relative to regulations proposed by the Bureau of Biological Survey affecting wild fowl. The Director is a member of the Board.

## ACKNOWLEDGMENTS

Individuals and the local fish and game clubs and chapters of the Izaak Walton League continue to take active interest in making special contributions for the purchase of lands and the development of our fish hatcheries and game farms—to this extent enlarging the appropriations for new construction. There is no more useful activity for the organizations to follow than that of raising funds to assist in building additional rearing pools at the hatcheries, and pens or yards at the game farms, for these will yield substantial returns for many years after the initial investment. The disposition of contributions made to date is as follows:

*Stockwell Ponds Fund*

The balance carried over from the previous year (recorded in our last report as \$64.20), proved in the final accounting to be \$81. Additional contributions were received, as follows:

South Seekonk Gun Club	\$50.00
Clinton Fish and Game Protective Association	25.00
Robert Milliken, Esq.	100.00
Nipmuc Rod and Gun Club—of Mendon	25.00
Needham Sportsman's Club	75.00
Grafton Rod and Gun Club	20.25
Blackstone Valley Fish and Game Club	50.00
Beaver Pond Fish and Game Club	25.00
Westboro Fish and Game Association	100.00
	<hr/>
	\$470.25

The above balance of \$81, together with \$271 of the year's contributions, was used to advance the construction of the large concrete and stone dam on the Welsh-Sullivan properties; also for continuing the construction of the dam on the Thompson property. Additional stone work was put up on the Putnam dam, paving the way for the elevation of the roads at this point. The balance on hand at the close of the year is \$199.25.

As a contribution toward the development work on the Stockwell Pond Unit the town of Webster paid bills for work at the ponds amounting to \$242.



*Amherst Fish Hatchery Fund*

Contributions toward the advancement of the development work were received, as follows:

The Paper City Rod and Gun Club forwarded contributions from the following local clubs:

Agawam Sportsmen's Club	\$50
Paper City Rod and Gun Club	200
Southampton Rod and Gun Club	20
Holyoke Fish and Game Association	100
Holyoke Chapter Izaak Walton League	50
	<hr/>
	\$420
West Springfield Fish and Game Club	25
Norwottuck Fish and Game Association	50
Leeds Rod and Gun Club	25
Florence Fish and Game Association	35
Charles P. Curtis, Esq.	25
James S. Lee, Esq.	25
Dwight Blaney, Esq.	10
Benj. P. Ellis, Esq.	10
Massachusetts Fish and Game Association	300
	<hr/>
	\$925

The gift of the Massachusetts Fish and Game Association is to cover the purchase of an additional tract of land (the so-called Hubbard property) adjoining the Amherst Fish Hatchery and adjacent to the superintendent's house. This will permit moving back the garage, and relocating the storage and meat house, together with a relocation of the loading stand and holding boxes which will greatly improve the facilities for distributing fish. It will also provide the necessary ground to regrade and properly drain the road leading from the State highway to the superintendent's house. Though negotiations are under way, at the close of this report the purchase has not been completed.

For the completion of a system of four large rearing pools \$396 was expended, \$190.75 applied toward the construction of the new hatchery building, \$300 is reserved for the purchase of land mentioned above, and a balance of \$38.25 remains on hand.

*Montague Fish Hatchery Fund*

A balance of \$130.25 was brought over from the previous year, and the following additional contributions were received:

Pittsfield Sportsmen's Club	\$25
League of Franklin County Sportsmen's Clubs	100
	<hr/>
	\$125

The balance of \$130.25, together with \$100 from this year's contributions, was expended to cover part of the cost of further developing two series of large rearing pools which have been under construction for about two years. A balance of \$25 remains on hand.

*Gifts of Land*

The public continues its interest in the principle of permanent wild life sanctuaries. It is becoming more and more convinced that the surest guarantee of maintaining a wild life stock lies in the existence of permanent, well-administered sanctuaries scattered throughout the State.

During the year the following gifts of land were received:

From Dr. John C. Phillips, approximately 2 acres (known as the Lake Lot) located in the town of Boxford, as an addition to the Boxford Sanctuary.

From the Associated Committees for Wild Life Conservation, approximately 92 acres, located in the town of Boxford, as an addition to the Boxford Sanctuary.

From the Federation of the Bird Clubs of New England, Inc., approximately 2 acres (formerly known as the M. Louise Stockwell corner) at West Sutton, as an addition to the Merrill Pond System.

From the Federation of the Bird Clubs of New England, approximately three acres (known as the Van Woert property) in East Sandwich, as an addition to the East Sandwich Bird Farm.

#### *Other Gifts*

The balance of \$38.42 of the fund raised in 1927 by the North Shore Rod and Gun Club (including contributions from Ralph S. Bauer, Esq. of Lynn and from the Massachusetts Fish and Game Association) to pay for the salvaging of fish from Wenham Lake, remains on hand at the close of the year.

The balance of \$1.20 carried over last year from the funds contributed by the Federation of the Bird Clubs of New England, Inc., and Isaac Sprague, Esq. in 1927 for the removal of buildings from Carr Island, was used for lumber for the placing of signs on the property. The Division acknowledges the receipt of a further contribution of \$50 from Isaac Sprague, Esq. to be used for further development of Carr Island. This amount has been carried over for future use.

The North Worcester County Fish and Game Club voted \$50 to hire legal assistance for the wardens in that district on an important case of violation of the law concerning the use of poison capsules.

### **ENFORCEMENT OF LAW**

Several changes will be noted in the personnel of the law enforcement unit during the year.

On December 1, 1928 Wardens Elmer A. Macker of North Grafton and William H. Seaman of Fall River were detached from the warden force and promoted to the fish culturist class, ranking with the superintendents of the fish hatcheries, to act as superintendents of fish salvage units. Their places on the warden force were filled by the appointment of Herbert C. Peaslee of Amesbury and Walter W. Gilmore of Milford, respectively.

On June 1 Warden Walter A. Larkin of Andover was retired from the service on half pay because of permanent disability received in line of duty. Warden Larkin had a record of twenty years of efficient and faithful service, and his disability was caused by the conscientious manner in which he went about his duties. His place on the inland warden force was filled by transferring Warden Henry M. Parlee from the coastal warden service.

On August 1 Warden Albert L. Stratton of Gardner was retired from the service, having fulfilled the age and service requirements to obtain a pension. Arthur F. Hughes of Brookline was appointed to the inland warden force to succeed Warden Stratton.

On September 9 Warden Don C. C. Lewis of Fairhaven, a member of the coastal warden force, tendered his resignation.

Four additional men were appointed to the coastal warden force in September, in the persons of Henry A. Crowley, Worcester; Ellsworth E. Hubley, Worcester; Howard S. Willard, Orange; and Everett H. Trask, Hopedale. The first two named succeeded Wardens Parlee and Lewis respectively, and the latter two were additions to the force.

On November 16 Warden Thomas L. Burney of Lynn retired from the service, having reached the maximum age limit of seventy years. Warden Burney served the department for twenty-nine years as a fish and game warden and established a creditable record during that period of time.



The Legislature of 1929 created the office of State Supervisor of Marine Fisheries, to which Mr. Zenas A. Howes of Wellfleet was appointed, effective October 16. In accordance with the terms of the law under which his office was created, the coastal warden service was transferred to his supervision. This is the first time since the establishment of the department that any division has been made in the law-enforcement work. We now have a coastal warden force and an inland warden force. This has resulted in a better program for the enforcement of the fish and game laws.

The law-enforcement work was conducted in substantially the same manner as in previous years, except that an increase will be noted in the number of cases prosecuted.

The court work for the year was as follows: Number of cases, 1,761; convicted, 1,653; discharged, 108; (filed, 246, appealed, 89); fines imposed, \$23,795. In addition to the penalty imposed by the courts, each person convicted loses any sporting license or trapping license which may have been issued to him, together with his right to secure a license within one year following date of conviction. Licenses revoked: resident citizen sporting, 320; non-resident sporting, 7; resident trapping, 34; non-resident trapping, 2; alien sporting, 3; minor trapping, 9; resident lobsterman, 3; total, 378.

A survey of the court records for the year again discloses the fact that one of the outstanding violations is that of fishing without securing a sporting license. This situation prevails from year to year, although the warden force continues a persistent prosecution of the violators, and despite the fact that the public is periodically warned that a license is required to hunt, fish, or trap. Efforts have also been made to bring home to the public that the Division, in so far as it operates for the benefit of the hunters, fishermen, trappers and wild life lovers in general, is financed by appropriations based largely on the revenue from the sale of these licenses. It is apparent that neither prosecutions nor education makes much progress along this line, although there is no such tendency to violate the law in so far as the requirement of a license to hunt is concerned.

The other outstanding violation of the year involves the work of the coastal warden force in the patrol of the contaminated shellfish areas. The records show that 353 cases were prosecuted where persons attempted to take shellfish from areas which the Department of Public health has certified are contaminated. Despite these figures, it is believed that progress is being made in stopping the illegal taking of these shellfish which are a menace to public health. Lack of public support is noticeable in connection with these violations, and it has been the policy of the Division to prosecute, wherever possible, the retail dealers and public who create the market for the shellfish and thereby encourage the illegal taking.

Except as noted above the court records for the year show that the total number of cases represent many and varied violations. Under each heading a substantial number of prosecutions has been made.

Although the total number of prosecutions exceeds any previous year the wardens have followed out the policy of the Division in not prosecuting trivial or technical cases, and only such cases as deserved the serious consideration of the courts were entered for trial. No minors are brought into court before exhausting all efforts with parents and probation officers to avoid repetition of offenses. This fact is best indicated by the comparison of the number of convictions secured with the number of cases entered.

An increase is noted in the number of cases for hunting on the Lord's Day. The wardens have experienced more difficulty in handling this particular form of violation during the past two or three years, possibly due to the liberalizing of the Sunday Sports law, and many seem to believe that this law either does or should give the privilege of hunting on



Sunday. Nevertheless the warden force is rigidly enforcing the law and made 51 prosecutions during the year.

Although the charge of hunting without a license does not compare with the companion charge of fishing without a license, yet 123 cases were prosecuted, which is an increase over the records of the past few years. It is difficult to see why persons interested in either hunting or fishing deliberately attempt to evade the license law, knowing that a conviction represents a fine much larger than the license fee, together with the loss of a license for a year.

The records further show that the trapping laws were reasonably well obeyed. The largest single violation noted was that of failure to mark the traps with the name of the owners, and 51 trappers were prosecuted on that charge. While this may seem like a minor violation, yet it is important as it very often follows that the trapper fails to mark his trap with his name as required by law because of his desire to violate other sections of the trapping laws without detection. Violation of the fishing laws made up a very substantial part of the court records for the year. The majority of these violations had to do with the taking of undersized fish. Many of the persons prosecuted on these charges never attempt to measure their fish and do not have a measuring stick in their possession. It is fully as important to return the small fish to the water as it is to refrain from taking them during the closed season, and if the fishermen will realize that the small fish returned today are the big fish which may be caught tomorrow, they will not be tempted to commit these violations which are far-reaching in scope.

To create an incentive for better work in the warden force, the Massachusetts Fish and Game Association offered a prize of a fine field glass to the warden performing the best all-round service during the year. The award was made by the officers of the Association to Henry M. Parlee of Watertown.

As in all phases of law-enforcement work, the success in the enforcement of the fish and game laws depends very largely upon public support. In the main the Division receives this in a high degree, and this is typified through the cooperation received from courts, police officials, sportsmen's clubs and interested citizens. The disappointing feature in this connection is the lack of interest on the part of the citizens to provide for the appointment of city and town fish and game wardens, as the law permits. Only fifty-three towns in the entire State requested such appointments. There is sufficient interest in fish and game protection in the State to make it possible to provide for such an officer in each city and town if the proper local initiative was taken to call the situation to the attention of the electorate of each municipality. Such wardens may receive compensation from the cities and towns up to the maximum of \$200 fixed by law.

#### NEW LEGISLATION

The changes made in the fish and game laws by the legislature of 1929 may be summarized as follows:

Chapter 44 strikes out section 41 of chapter 131 of the General Laws and inserts in place thereof a new section, which prohibits the importation or liberation of any live game bird or any live wild game or furbearing quadruped without first obtaining a permit from the Director. Under the previous law as contained in section 82-a it was illegal to liberate wild birds, but the new law prohibits the importation of any species without a permit.

Chapter 47 provides a closed season on calico bass and crappie between December 1 and July 1, a minimum length of six inches, and a daily bag limit of twenty.

Chapter 82 provides a closed season on the great northern pike or

muscallonge between November 15 and May 30, and imposes a minimum legal length of twenty inches. These fish are increasing in certain parts of the Connecticut River.

Chapter 83 amends section 58 of Chapter 131 of the General Laws by striking out the word "quadruped" and inserting the word "animal." The previous law, while protecting wild and domestic quadrupeds, was changed on petition of those interested in protecting domestic fowl, by inserting the word "animal" which covers fowl as well as quadrupeds.

Chapter 127 gives to the cities and towns in Plymouth County the same right to plant and grow shellfish as now exists in Barnstable and Bristol Counties.

Chapter 138 provides for a one-week open season on deer in Plymouth County.

Chapter 209 provides for a one-year closed season on ruffed grouse.

Chapter 304 amends the present shellfish law to the extent of limiting the number of shellfish which may be taken by an inhabitant of the Commonwealth for his own family use to one-half bushel of clams or quahaugs a day, or one bushel in one week, and one bushel of scallops per day, or one and one-half bushels per week. The law also provides that no quahaug or clam shall be taken that is less than two inches in its longest diameter.

Chapter 321 provides that Tashmoo Pond, Oyster Pond and Tisbury Great Pond on Martha's Vineyard shall be considered as never having been stocked with white perch. This will remove from them the restrictions on white perch which now apply to other ponds which have been stocked with these fish.

Chapter 372 creates the office of State Supervisor of Marine Fisheries and provides for the appointment of such official by the Governor. It charges him with the enforcement of all laws pertaining to marine fisheries, and shellfish, and gives him certain other powers and duties.

Chapter 34 of the Resolves provides for a special recess commission of seven members to survey and codify the game and inland fish laws and report to the legislature of next year.

#### RECOMMENDATIONS FOR LEGISLATION

Under the terms of the special resolve creating a commission to revise and codify the game and inland fish laws, the following members were appointed to the commission: by the President of the Senate, the Hon. Elbert M. Crockett of Milford; by the Speaker of the House of Representatives, Representative Ernest J. Dean of Chilmark and Sydney M. Williams of Wellesley; by His Excellency the Governor, Dr. John C. Phillips of Wenham and Jacob M. Haigis of Shelburne Falls; by the Attorney General, Assistant Attorney General Gerald J. Callahan of Holyoke; and by the Director of the Division of Fisheries and Game, Deputy Chief Warden Raymond J. Kenney of Lowell.

The commission held many public hearings throughout the State and made a thorough survey of the laws and their adaptability to present conditions in the Commonwealth. In its report to the General Court it will recommend many changes which should prove of great administrative value.

The Division made no recommendations for changes in the laws this year, for the reason that desirable changes have been recommended for consideration of the special commission to revise the laws. A committee of wardens, consisting of Supervisor Frederick W. Goodwin, Wardens James A. Peck and Carl E. Grant, devoted much time to the study of the laws from the standpoint of law-enforcement. This committee, through Deputy Chief Warden Kenney who represented the Division on the personnel of the special commission, made numerous recommendations for changes in the laws.



## EDUCATION AND PUBLICITY

Through releases to the press and special articles we continue to keep the public informed of the work in general.

The Chief Warden continues to represent the Division, supplemented by the Director, at many meetings throughout the State, where, through the use of lantern slides, the public is informed of the workings of the Division and educated in the theory and practice of wild life conservation.

The exhibit at the Eastern States Exposition in West Springfield was made up on quite different lines from that of previous years. Assistance was also rendered in putting on exhibits at the Franklin County Agricultural Society's fair at Greenfield, and at the fair of the Worcester Agricultural Society at Worcester.

## BIOLOGICAL SECTION

### GENERAL

The year's activities were divided among research work, field work, and the handling of general biological and distribution problems.

### FIELD WORK

Numerous inquiries were handled on miscellaneous biological subjects; field problems were investigated, including those arising at the fish hatcheries and game farms; special attention and study given to trout feeding experiments by use of an automatic feeding arrangement; and considerable time was given in an advisory capacity to the sportsmen's associations in connection with rearing fish and birds, and on the construction of the trout rearing pools and pheasant wintering pens in which State fish and birds are reared.

An attempt was made to capture a supply of native cotton-tail rabbits from private grounds where they were not desired, by the use of a ferret, but it was not found possible to collect the rabbits in sufficient quantity to make the project worth while.

Several cases were investigated of fish dying in ponds, specimens collected and autopsied.

Considerable time and study was given to the development of our fish salvage activities and obtaining the necessary permission to operate in the closed waters selected.

Periodic visits were made as usual to all of the fish hatcheries and game farms during the year, and particularly in the rearing and distribution seasons, to inspect the stock and to advise generally on the work as it progressed.

All fishways were inspected periodically during the season, adult alewives were assisted over various obstructions on their way to the spawning grounds, and observations were made on several of the more important fishways. Considerable time was given to further study and survey, by experts, of conditions on the Parker River.

### DISTRIBUTION

The study of the proper waters and covers in which to liberate stock produced at the fish hatcheries and game farms should be, and is, one of the most important features of the biological work. The details involved in the transportation of all fish, birds, rabbits and hares distributed annually by the Division continue to increase, and the apportionment of the stock to its proper covers and waters through the means of the Sportsmen's clubs and local chapters of the Izaak Walton League of America is one phase of the work which consumes a vast amount of time.

The list of inland waters legally stocked by the Division since January 1, 1910, which we are required by law to publish annually, was revised and brought up to date.



Special consideration was given to stocking these ponds suitable for white perch and which have never been stocked with that species, in order to bring them within the requirements of the white perch law.

A special effort was made to obtain permission to stock privately owned waters in order to bring them within the present license law. During the summer months additional assistance was employed to carry forward the survey and classification of our inland waters commenced the previous year. There is great need of much work along these lines until the status of each inland water is definitely determined and the principal biological as well as physical facts recorded—together with an official survey.

### FISH AND BIRD DISEASES

The routine pathological examinations of diseased fish, birds and quadrupeds were made at our request by Dr. E. E. Tyzzer of the Harvard Medical School. We take this opportunity to thank Dr. Tyzzer and his assistant, Dr. Hans Theiler, for the time and labor they have gratuitously given as advisors to the Division on such matters.

Thanks are due also to our former biologist, Dr. David L. Belding, who has rendered valuable assistance on many occasions.

During the rearing season evidence of disease appeared among the pheasants at the Wilbraham Game Farm. Specimens were sent to the Department of Veterinary Science, Massachusetts Agricultural College, and autopsied by Dr. W. R. Hinshaw, who diagnosed the disease as a mild form of coccidiosis. On his recommendation, special rations were fed to the birds and the disease soon abated. (For details, see report of the Wilbraham Game Farm). Thanks are also due to him for his valued assistance.

Early in July the brook trout at the Amherst Fish Hatchery were infected with an epidemic of tail rot. A month later Gyrodactylus made its appearance and was successfully treated. About the middle of September a gill trouble never before observed, appeared, and Dr. H. S. Davis, Pathologist of the United States Bureau of Fisheries, came to the hatchery to study the disease and work with the superintendent in treating the fish. (For details, see report of the Amherst Fish Hatchery). Acknowledgement is also made of our indebtedness to Dr. Davis and to the Bureau of Fisheries for their interest and cooperation.

### WILD BIRDS AND ANIMALS

#### WINTER FEEDING

Owing to the open winter practically no feed was distributed for the wild stock in the field.

#### BREEDING SEASON

Due to uniform, moderate temperatures and the absence of wet weather, the breeding season for all wild life was one of the most favorable likely to be experienced in many years.

#### FIRES

The absence of drouth conditions made it unnecessary to consider closing the trout fishing season. The hunting season was not closed as has been the case on several occasions, though at one time it was seriously considered whether, owing to the dry conditions, the public, including the hunters, should be excluded from the woods. (See Upland Game—The Hunting Season).

#### POSTED LAND

The usual fluctuations in the posting of land continue. Occasionally there is concerted action on the part of many land owners, such as was

the case in the town of Hardwick this year, when a large area was posted against both hunting and fishing. This emphasizes our oft-repeated statements that action should be taken to acquire the land on both sides of our principal streams to provide public fishing grounds. This is entirely practicable and would be of equal benefit to the farmers and to the sport-loving public. The rapid increase in wayside stands and over-night camps has opened up to our land owners a source of revenue that is assuming gratifying proportions. Through the wayside stands our farmers are more and more realizing the retail prices for their outputs with the minimum operating expense. Hundreds of beautiful locations are being devoted to over-night camps where the tourist can find comfortable accommodations at a reasonable price. The success of these enterprises depends on the extent to which the city and town dwellers can be induced to come into the country. Viewed from any angle, public fishing grounds, properly patrolled and well stocked and administered, would be an asset to any community in which they were located. In a small state like Massachusetts, with its great population, public shooting grounds will never be practicable.

Next year Massachusetts will celebrate its Tercentenary. It is estimated that millions of people will visit the State. At least one study has been made which reveals that the large majority of non-residents who visit Massachusetts annually come here to enjoy our seashore and beautiful countryside rather than to visit our historical monuments and places. (I refer to the conclusions reached by Lawrence William Chidester in a thesis, "The Advertising Problem of the Recreational Industry in New England," submitted by him to Tufts College this year in partial fulfillment of the requirements for the degree of Master of Arts in Economics, in the Department of Economics and Sociology).

There is no greater adornment of our lovely country-side and our shores than an abundant population of wild life. The protection and increase of this wild life should receive greater recognition and financial support, whether the aesthetic or the economic value be considered. In the former lies an inspiration to our people. In the latter lie many elements of value—the health-giving pleasures of pursuit, the utilization as food, or the sale of furs; the millions of incidental business in the manufacture and sale of sporting equipment, and transportation; the extent to which it is a factor in revenues from tourists; and the value to agriculture from the presence of insect-destroying birds.

Often we have referred to the democratic attitude of our land owners in permitting the public to hunt and fish over their properties. This condition continues, and there is increasing evidence that these privileges are more and more appreciated by our hunters and fishermen. It is interesting to note that during the early part of the open season on upland game, starting October 20, when the closing of the woods was under consideration by reason of the drouth conditions, fewer fires occurred during the hunting days when the sportsmen were at large, than on Sundays when they were not.

## MIGRATORY BIRDS

### *Song and Insectivorous Birds*

Eighty-two permits to take protected birds, their nests and eggs, are in effect. These permits are now issued good until revoked. However, the holders are required to make annual reports, of which 78 were received, recording the taking of 223 birds and 242 eggs.

We consider the protection of our song and insectivorous, and harmless non-game birds, to be of as great importance as the protection of those species classed as game. Our wardens fully understand this policy, and during the year a number of convictions were secured for destroying eggs or birds of such species.



*Migratory Game Birds*

*Shore Birds.*—There has been no change in the Federal regulations continuing a closed season on all species of shore birds. Considerable sentiment is developing in favor of re-opening the shooting season on some species, due to what appears to be an increase in numbers. However, we again sound the warning that great care must be taken in estimating the increase, if any, for the reason that the migration now proceeds more leisurely than was the case when hunting was permitted.

*Plover.*—Both the spring and fall migrations indicate that the increase shown last year is sustained. Owing to the difficulty of identification it is questionable how much credence is to be given to the reported increase in golden plover. The reports indicate some increase in this species and a continued increase of the black breasted plover. The status of the upland plover remains about the same. The piping plover is reported on its rather limited range as holding its own.

*Snipe.*—The spring migration was usual. Owing to the drouth conditions throughout the State the fall flight was light.

*Woodcock.*—A moderate increase in the number of breeding birds appears to be taking place annually. During the first ten days of the open season woodcock were well scattered throughout the State. The tendency of most sportsmen during the early part of the open season is to rush to the pheasant covers—particularly in such a year as this when the season on grouse is closed. It is only the seasoned woodcock hunter who devotes the first days of the open season to hunting this choice bird. He understands that pheasants will be with us always, but that the woodcock are here today and gone tomorrow. If more of our sportsmen would devote themselves to the woodcock in the early season, they would be surprised at the sport to be found. There were no pronounced climatic conditions to force a migration.

*Rails.*—The season continues to open coincident with the duck season. Owing to the drouth very little rail shooting was afforded.

*Sandpipers.*—These birds continue to show an increase.

*Winter and Summer Yellowlegs.*—There was an excellent spring flight of both species. The summer and fall migrations were marked by an increased number.

*Curlew.*—There is a steady increase in curlew, particularly the Hudsonian curlew, although from year to year more specimens of the sickle bill are reported.

*Ducks.*—The wood duck continues to hold its own. Each year we note the problem of the hunters in distinguishing this duck by reason of its immature plumage and the fact that it is found so often in the same areas as our common black duck. This bird is particularly responsive to sanctuary conditions, and we believe that if more sanctuaries are established and the conditions made increasingly attractive to wood ducks, we will be able to increase the breeding stock.

Mallard, teal, pintail and canvasback ducks continue each year to be taken, but with no appreciable increase in numbers.

The spring and fall flights of red heads and blue bills continue subnormal, but with something of an increase this year over last year.

The black duck continues to register a slight increase. We continue to emphasize the possibilities in this bird. If more breeding grounds could be set aside and developed to their maximum attractiveness the annual production could be greatly increased. No duck excels our native black duck in flavor when taken at a time when a proper food supply is available. The question of permitting the baiting of black ducks at duck stands calls for serious consideration. If prohibited it would result in a much wider distribution of the ducks, with a resulting increased opportunity for hunters at large to bag a few birds. The development of breeding grounds and sanctuaries, the reduction of vermin of all species on these areas, the



elimination of baiting with the resulting concentrated kill, would produce a most gratifying result.

*Geese.*—From December 1, 1928 to the close of the season the movement of these birds should be described as usual.

The fall flight (to Nov. 30, 1929) has come along per schedule, and with enough birds to supply good sport. Every year the migration becomes more and more complicated for these birds in particular. Each year we are receiving increasing complaints of the influence of our flying fields and the presence of large numbers of aeroplanes. The flat areas adjacent to our shores offer exceptionally favorable grounds for the construction of flying fields—serving as they do all classes of air-craft. It is along the coast that the heaviest migrations take place, with the resulting conflict and adverse influence. This applies to all manner of migratory birds, but to geese and ducks in particular.

There is nothing out of the ordinary to record of the spring and fall flights of brant. They continue to come to the usual areas without any noticeable increase in their range. As the administration of wild life improves throughout the northern hemisphere we look for a gradual increase in this particular species.

*Statistics of the Gunning Stands.*—Number of stands reported, 135; ducks shot, 12,373; geese shot, 7,021; live duck decoys used, 4,594; wooden duck decoys used, 3,360; live goose decoys used, 5,604; wooden goose decoys used, 4,016.

#### *Migratory non-game Birds—Gulls and Terns*

The arrival and departure of the gulls and terns was usual and the breeding season as a whole satisfactory. The increasing complications of adjustment between the wild life on the one hand and civilization on the other, is illustrated by the increasing number of complaints of damage to craft by being fouled up through the perching habits of these birds.

#### *Federal Control of Migratory Birds*

It is a great satisfaction to record the signing of the Norbeck-Andresen Migratory Bird Conservation Act by President Coolidge on February 18, 1929. This brought to a successful close the struggle of many years by those who have worked for increasing Federal control and assistance in the rehabilitation of these birds.

So many national and local organizations and individuals participated in the campaign at one time or another during these years, that it is impossible to list them. Aside from the merits of the bill itself and the results accomplished in this special field, the long campaign has had an educational effect on the people of this country in the modern conception of game administration, that will continue to bear fruit for many generations to come.

The bill makes no appropriation; it "merely authorizes a certain schedule of appropriations totalling in the aggregate about eight million dollars, beginning with an initial appropriation of seventy-five thousand dollars for carrying on a survey to determine the areas available for" the purposes of the bill. These purposes are to acquire for all time the principal breeding, feeding and wintering areas of the several States. Before any lands are taken the Legislature of the State must approve. A special commission is created to handle these matters of which the officer in charge of the fish and game work in a given State shall be a member during the time that lands in his State are under consideration. The schedule of appropriations authorized in the bill calls for \$75,000 for the fiscal year ending June 30, 1930; \$200,000 for the fiscal year ending June 30, 1931; \$600,000 for the fiscal year ending June 30, 1932; \$1,000,000 for the fiscal year ending June 30, 1933; \$1,000,000 for each fiscal year thereafter

for a period of six years; and \$200,000 for the fiscal year ending June 30, 1940, and for each fiscal year thereafter.

It is always well to bear in mind that the conservationists of the country must annually remain alert to see that the annual sum provided above shall actually be appropriated for the purposes of this great work.

## UPLAND GAME

### *The Hunting Season*

The absence of rain throughout the summer and fall resulted in a condition the like of which may not be experienced for many years to come. Streams were very low, with many of them completely dry; most swamps were practically dry; and ponds and reservoirs exceedingly low. However, the general conditions were such that it was decided to take no step toward postponing the season on account of drouth, unless the presence of large numbers of sportsmen in the covers resulted in an increase in forest fires to such an extent as to make this necessary. The season opened on Monday, October 21. It is a great satisfaction to record that there was no substantial increase in forest fires during the week. On Sunday, October 27, there was a comparatively large outbreak of fires so that serious consideration was immediately given to the necessity of closing the woods to all the public, including the hunters. At no time was the suspension of the hunting season contemplated—only the exclusion of the hunters from the woods. Fortunately, rains appeared on Wednesday, October 30 and continued for such period and in such volume as to remove any further question as to the closing of the season for this year. At this point, on behalf of Commissioner Bazeley and our Division, we take the opportunity to compliment the hunters on the great care exercised, and the practical demonstration that the presence of sportsmen in the covers does not necessarily mean an increase in forest fires. We are more and more coming to understand the deadliness of the forest fire to our wild life stock and are governing ourselves accordingly.

*Pheasants.*—The maintenance of a satisfactory pheasant stock in our covers will always be complicated by the fact that substantial sections of the State are not natural pheasant country. Probably few states in which the pheasant is bred and distributed as a game bird have a larger percentage of territory apparently unacceptable to these birds. This is a basic factor that must always be reckoned with when considering pheasant shooting.

By following so far as possible, our present policy of liberating the output of our game farms as adult pheasants in the spring and shortly prior to the start of the breeding season, we believe that we can come nearer to an even distribution of the stock over the State than by any other method. We believe that under this plan many birds will breed in localities from which they would wander away if liberated in the fall and had until the following spring to select their breeding grounds.

We continue to note the indifference of the hunters in reporting the kill of cock pheasants, although this is a requirement of the law. Recognizing some of the disadvantages of our earlier regulations as to the time for reporting the kill, the hunters were given this year a period of ten days after the close of the shooting season, within which to make the report. This leaves no excuse whatever for any hunter failing to report his kill. It is a reasonable regulation, and an accurate record of the annual taking is an essential requirement of businesslike game administration.

The total number of cock pheasants reported shot in open season was 2,902, divided according to counties as follows:—Barnstable, 18; Berkshire, 40; Bristol, 159; Essex, 362; Franklin, 98; Hampden, 286; Hampshire, 290; Middlesex, 568; Norfolk, 159; Plymouth, 175; Suffolk, 4; Worcester, 659; locality not reported, 84.



*Ruffed Grouse.*—The problem of administering our wild life stock has been more emphasized in relation to the grouse during the past two or three years, than perhaps in any other field. It illustrates the desirability of giving to the administrator of the wild life stock more authority to regulate the opening and closing of the seasons and the number of birds which may be taken in a given year.

At the last session of the Legislature a bill was introduced to give more authority to the Commissioner or the Director (subject to the approval of the Governor and Council) to regulate the open season and bag limit on grouse. However, this bill failed of enactment. If no action had been taken by the Legislature an open season would have prevailed this fall. After the failure of this bill the Director made a quick but extensive canvass of conditions throughout the State, and it was decided to give the birds the benefit of the doubt. The Director filed a recommendation for a close season, which was supported by the sportsmen. A favorable breeding season ensued, with most encouraging reports of the come-back staged by the birds in many parts of the State. The foregoing illustrates the inelasticity of the system which prevails. Under it it is necessary to determine during a legislative session (which occurs annually in the winter and spring) what shall be the policy of the State for a given year in administering its wild life stock. During this early period conditions may on their face warrant an open season the following fall, but the decision must be made *prior* to the breeding and rearing period, and with possible adverse factors being unknown. Many adverse factors may combine between the close of the legislative session and the opening of the breeding period to make it highly inadvisable to have an open season, yet nothing can be done to give the stock adequate protection at the time it needs it most. The proposition cuts both ways. Adverse conditions which obtain early in the year and are the basis of legislation to close a season or to extend an existing close season, may be entirely overcome by the time of the subsequent breeding and rearing period, so that a limited or a usual open season might be ordered with perfect justification. No fish and game department in any state can ever give the business-like administration demanded unless it has greater latitude to determine these important matters.

The dry and favorable breeding and rearing season of this year has resulted in a most gratifying increase in the grouse over a large portion of the State. There continue to be localities where the birds have not prospered. But as we have said on many occasions, these "spotty" conditions will always obtain.

The New England Ruffed Grouse Investigation Committee continues its good work. Owing to our closed season but few specimens have been available from this State for the investigation. The local clubs and the public generally have been notified of the continuance of the work and urged to ship to Dr. Alfred O. Gross, Bowdoin College, Brunswick, Me., any specimens which have been accidentally killed. We shall continue to urge the public to send to Professor Gross all specimens found at any time of the year. We have asked that the whole carcass be sent, securely wrapped, with the name of the sender on the package, and an explanatory letter forwarded giving the locality from which the bird was shipped and all the known circumstances of its death.

*Quail.*—The drouth conditions which prevailed prior to and during the quail season caused the birds to hang more to the deep recesses of the large swamps. The hunters who did not understand these conditions might easily conclude that in a given region the birds were scarcer than usual. As a matter of fact, in the absence of a winter kill the quail have demonstrated a remarkable ability to withstand the present open season. If the public will appreciate the deadliness of ad-



verse weather conditions to the end that we can receive a widespread response to any appeal that may be sent out at a given time to feed the quail,—we will be taking the principal step toward preserving this bird, and when sent out would be on the basis of an emergency, and unless the public makes an immediate and thorough response the loss will be suffered. The second most important activity to maintain and increase the quail stock is adequate vermin control in all areas where these birds are found. In those counties where quail shooting is now permitted, the birds are more than holding their own. In some of the counties closed to shooting they are making some progress, but the improvement is coming slowly. The greatest need in these closed counties is to have native birds to carry on a systematic restocking over a period of years. We hope in time that this needed stock will be supplied from our game farms. All of this development is coming slowly, for the reason that we are working with our native stock. The only available supply is Mexican Bob whites, which we feel is inferior to our native stock in this region where we are constantly faced with the menace of the winter kill.

*Deer.*—A study of the protection given to our native white tailed deer from the Colonial times to the present would unfold a most interesting picture. From an abundance at the beginning of the settlements the deer were reduced almost to the point of extermination. Then for many years they had their ups and downs as the result of ineffectual protection and a reduction of their range. Some years ago it was necessary to protect them throughout the entire year. The abandonment of large areas that were once cleared lands, better protection and short open seasons have firmly established them throughout the entire State. It would be very interesting, some time, to print the history of the deer beginning with the Massachusetts colonies, but without attempting to gradually trace each step, it is sufficient to say that after a closed period of years the season was opened in 1910. From that time until 1928 there has been a one-week open season, which, beginning with 1928 was increased to two weeks. At first the open season applied to only a portion of the State, and finally was extended to all parts. Since that time, off and on, certain counties have been given closed seasons of varying periods of time.

Despite the continuance of the one-week open season annually, the taking of does as well as bucks, and the wide-open law which permits the land owners to destroy deer which they have reason to believe are about to do damage, the deer stock in our State has continued to increase to the point that annually substantial sums are being paid for damage by them to crops and fruit trees.

In the deer season falling within the period of this report (December, 1928) a State-wide open season of two weeks obtained for the first time. The prediction that this would result in an excessive killing did not materialize. The total kill was 2,024 deer as compared to 2,261 deer which was the previous record kill of 1926. It is always difficult to make any accurate appraisal, for the hunting conditions are an important factor. The total kill of 2,024 deer was divided into 1,068 bucks and 956 does, divided by county as follows: Barnstable, 282; Berkshire, 560; Bristol, 62; Dukes, 1; Essex, 36; Franklin, 288; Hampden, 252; Hampshire, 130; Middlesex, 25; Norfolk, 11; Plymouth, 173; Worcester, 194; locality not reported, 10.

Deer shot while damaging crops numbered 139.

There were brought over into 1929 (because in process of appraisal), and paid, 35 claims filed in 1928 amounting to \$1,417.09. In 1929 there were received 230 claims which were approved and paid in the amount of \$9,333.94. There were also received 2 claims which will be approved and paid within the next fiscal year.

The new method of appraisal of damages continues to justify itself.

The great variety of the claims is impressive. In recent years we have paid for damage to fields of pansies, gladioli, carrots trenched in for the winter, fields of alfalfa, a variety of garden crops, and fruit trees. The new method of appraisal takes into consideration the age of the tree, the extent of the annual growth as bearing on the condition of the tree, and the quality of the soil. Claims are adjusted on a percentage basis from total loss down. We have begun investigations looking to some system by which each tree can be permanently marked when once it has been injured, in order that the tree will thereafter carry a record that will be easily ascertained by appraisers in subsequent years. In other respects we are endeavoring to work out a system that will give reasonable compensation where warranted, but will increase the efficiency of our check on a given orchard or other damaged area.

*Squirrels.*—The number of squirrels in a given region continues to bear a close relation to the food supply. In no section can squirrels be considered plentiful, but in some localities still afford a reasonable amount of sport. This refers to the gray squirrel, for the fox squirrel is not a native of this State. The red squirrel is not protected and should be classified more as a predatory species by reason of its destruction of bird life.

*Hares and Rabbits.*—We continue to recommend to the sportsmen a substantial reduction in the present open season on hares and rabbits. This extends from October 20 to February 15. We repeat that there is no form of upland game in the United States which will stand our present open season on this species. However, it is only fair to state that in certain sections there has been a gratifying increase in the number of cottontails. In that portion of the State which can be classed as natural white hare country, these animals are merely holding their own, despite the substantial numbers annually imported by the Division, individuals and clubs, for restocking purposes.

Owing to the presence of tularemia in the regions from which cottontails can be imported for restocking, we have been reluctant to issue any permits to bring these animals into the State. A more rigid importation law was passed at the last legislative session, which gives us more control over the situation. However, after carefully studying the matter and seeking further advice from the Federal authorities, we have decided to issue permits to persons found to be entirely responsible, to import cottontails subject to rigid restrictions involving an adequate quarantine period. There will be the further requirement that all animals found dead upon arrival of a shipment, or dying during the quarantine period, will be immediately turned over to Dr. E. E. Tyzzer of the Harvard Medical School, for examination.

The success with which we have annually collected and shipped cottontails from the colony on Penikese Island has encouraged us to undertake the establishment of other colonies from which we hope in time to meet, in a substantial way, our own annual restocking requirements.

*Fur-bearing Animals.*—The increase in the annual take of fur is gratifying, particularly in the case of the muskrat. The muskrat is a harmless animal (except for the damage it does to dykes in cranberry culture) and is an excellent article of food, as well as valuable for its fur. The wisdom of our present regulation prohibiting the taking of rats in the spring, is justified by the increase. A few years ago it was feared that the muskrat was on the verge of extinction in many sections of our State.

The report of fur taken by licensed trappers during the calendar year 1929 (the law requires the reports to be made for that period) is as follows:



No. of Reports	County	Musk-rat	Mink	Skunk	Red Fox	Gray Fox	Cross Fox	Raccoon	Weasel	Otter	Total
54	Barnstable	687	3	440	45	-	-	11	41	-	1,227
123	Berkshire	2,969	143	442	190	30	-	153	172	2	4,101
91	Bristol	1,792	61	507	50	1	-	21	51	5	2,488
3	Dukes	66	-	-	-	-	-	-	-	-	66
123	Essex	4,330	46	355	24	1	-	14	71	3	4,844
94	Franklin	939	40	582	214	29	-	38	52	-	1,894
212	Hampden	2,840	75	561	131	21	-	50	101	4	3,783
113	Hampshire	1,218	121	613	165	19	1	46	65	1	2,249
223	Middlesex	5,975	160	871	201	1	-	31	82	13	7,334
-	Nantucket	-	-	-	-	-	-	-	-	-	-
85	Norfolk	3,189	44	886	74	1	-	11	95	7	4,307
158	Plymouth	5,443	60	1,129	132	-	-	24	180	4	6,972
2	Suffolk	16	1	2	1	-	-	1	-	-	21
440	Worcester	6,300	385	1,801	401	20	-	78	190	4	9,179
27	Locality not stated	896	36	104	23	4	-	11	22	2	1,098
1,748		36,660	1,175	8,293	1,651	127	1	489	1,122	45	49,563

### ENEMIES TO GAME

The more fully the modern conception of the administration of game is understood, the more apparent is the need of systematic vermin control. Man has so completely upset the balance by his inroads, through one agency or another, on the desirable forms of wild life, that he cannot escape the responsibility of keeping to a harmless minimum some of the most destructive species which are generally classed as vermin.

We believe that the time has come for a systematic vermin-control branch of our work. At the start we should have several experienced trappers who would make up a vermin-control squad. Their duties should consist of travelling through the State, contacting our people and explaining the need of vermin control; instructing the trappers in more efficient and economical methods of taking fur-bearing animals and the other species classed as vermin which are not fur-bearers. In addition, each member of the squad could be assigned to a large territory of State-owned land (as a State Forest or one of the large watersheds surrounding State-owned water supplies) or large areas under private control, where he could keep up a systematic reduction of overhead and ground vermin.

We do not advocate the extinction of any species that comes within this classification, but believe that they should be reduced so that a proper balance may be maintained. The time may come when the State will finance a bounty system on at least some of the worst killers, but the establishment of a vermin-control squad is an immediate necessity.

Bounties of \$10 each were paid by county treasurers (under Section 90, Chapter 131, General Laws) on 104 wild cats (Canada lynx or loup-cervier), for which they were reimbursed by the Treasurer of the Commonwealth.

### RESERVATIONS

#### *Martha's Vineyard Reservation*

It is with profound regret that we are compelled to record the passing of the heath hen. At the close of the period covered by this report (November 30) but one lone cock bird has been observed on Martha's Vineyard in many months. It was last seen by the superintendent of the reservation on May 11, and on September 12 Mr. James Green reported that he had seen it on his farm.

The colony has continued to be under the observation of Dr. Alfred O. Gross of Bowdoin College, Brunswick, Me., whose report we print herewith. We take this opportunity to publicly express our appreciation to Dr. Gross and to Bowdoin College, whose generosity has made his



services available, for the painstaking research that he has made of these birds and the scientific record which he has compiled, based on years of contact and study. The heath hen will be the first bird to pass out of existence of which a complete scientific observation has been made. During the period from 1907 to date (November 30) the State has expended \$67,412.63 in its efforts to protect and preserve the heath hen. The outstanding scientific organizations interested in ornithology have been consulted, as well as scientists who were particularly qualified to advise, and we have sought near and far for assistance in the struggle. The record is too long to make individual public acknowledgment of the contributions, both of service and money. These appear in the permanent record which has been built up by Dr. Gross. But the State and all those concerned can at least feel that over this span of years a conscientious and persistent effort was made to preserve the heath hen from extinction.

Dr. Gross' report is as follows:—

"The annual Heath Hen census on Martha's Vineyard Island, Massachusetts, was taken March 30 to April 3, 1929, under the auspices of the Division of Fisheries and Game. The weather conditions were ideal during the entire period of the census. Since the last annual census taken for the Federation of the Bird Clubs of New England, Inc., in April, 1928, all active protection of the Heath Hen has been conducted by the State Department. Mr. Allan Keniston, Superintendent of the Heath Hen Reservation, has continued his trapping operations and vermin control and has thoroughly patrolled the entire region occupied by the Heath Hen. The last birds have been more or less restricted to the vicinity of the farm owned by James Green located near West Tisbury about four miles from the Heath Hen Reservation.

"The recent history of the Heath Hen is well known, but a review of the numbers of birds seen during the past two years will assist us in understanding the present status of the birds. In the 1927 spring census we were able to account for thirteen birds, two of which were females. In the autumn of that year only seven birds made their appearance. This flock appeared regularly on the open meadow at the Green farm, but during the course of the winter it dwindled one by one until only three males remained at the time of the annual census in April, 1928. At the approach of summer the three birds dispersed, as usual, to the scrub oaks where in the course of their wanderings one more bird was lost, as only two Heath Hens returned to the Green farm last fall. Special attention was given to these two birds and an effort was made to locate them each day. According to Mr. Keniston's daily reports they were both at the Green farm until December 8, 1929. Since that date only one bird has been seen.

"The entire region formerly occupied by the Heath Hen has been thoroughly combed again and again in the hope that other individuals would be located. Many interested persons of Martha's Vineyard aided in the search, and every place which could possibly harbor a few birds was visited. To stimulate further efforts to find birds a reward of \$100 was offered jointly by Mr. Thornton W. Burgess, Mr. Francis A. Foster, and Mr. John E. Howland, to anyone who would locate three Heath Hens, including a female, in any part of the Island. Later an offer was made by Mr. Burgess to anyone who would locate a single bird other than the one known to be on the Green Farm. These rewards have never been claimed, and therefore it is reasonable to infer that the lone bird at West Tisbury is the very last of his race.

"During the census the observers saw the bird each day in the open field near the buildings of the farm. It came out of the scrub oaks bordering the field soon after daylight in the morning, and again late in the afternoon of each day. The bird was wary and seemed constantly alert for any impending danger. It was quick to squat in the grass when

a hawk chanced to fly over the field, and at one time the swoop of a Marsh Hawk caused the Heath Hen to fly into its retreat in the scrub oaks. The bird though wary came very near to our blind at times to feed on the grain and seeds scattered there to attract it. Fortunately, this gave the observers excellent opportunities to make photographs and moving pictures at very close range of the last Heath Hen living a normal life under natural conditions. This last bird is a plump male, and its plumage is in perfect condition; it has every outward appearance of being a perfectly healthy individual.

"We did not see the bird 'boom' while it was on the field, nor has it been seen or heard to boom by those who have been keeping it under daily observation throughout the spring. One morning, however, we saw it fly to the top of an oak tree, and there it went through a series of characteristic performances. It erected its tail, threw its pinnate feathers forward, spread its primaries firmly against the sides of its body and inflated the orange-colored sacs in the true nuptial dance style. Even from that vantage point there were no fellow Heath Hens to admire or to challenge him. It is unusual to see a Heath Hen perched in a tree, and the 'booming' in such a situation is a real departure from the customary performance. But a bird bereft of all of its companions might well be expected to do that which is unusual.

"How long this bird will continue to live whether a day or a year or longer, only time can answer. The death of this bird will also mean the death of its race. It is the intention of the Massachusetts State Division of Fisheries and Game to allow the last Heath Hen to live its remaining days in a normal way among the scrub oaks of its ancestral home on Martha's Vineyard Island. As long as it lives it will be carefully observed and protected by the Superintendent of the Heath Hen Reservation. Never in the history of ornithology has a species been watched in its normal environment down to the very last individual.

ALFRED O. GROSS, Bowdoin College, Brunswick, Maine."

Throughout the year there were no destructive fires on any part of the heath hen range.

The superintendent has continued his work throughout the year along the same lines as in previous years, although no heath hen have frequented the reservation since the spring of 1928. This comprised trapping vermin; looking for other than the known heath hen; running down many reports of birds seen which were thought by the observer to be heath hen but which invariably turned out to be either quail or partridge when any bird at all was found; and the planting of buckwheat and clover for the quail and mourning doves and for heath hen if any should appear. The list of vermin taken by trapping is: 20 cats, 12 crows, 70 rats (and many more were destroyed by poison) and 3 hawks. The stomachs of the cats and hawks were examined, but nothing found worthy of note. Superintendent Allan Keniston resigned from the service as of November 1. He labored long and earnestly against discouraging conditions, to do his share of all that was done.

What disposition will finally be made of the reservation is a matter for future consideration.

### *Penikese Island Sanctuary*

Ducks and geese frequented the island throughout the year in larger numbers than at any time since it has been operated as a sanctuary. As many as 60 geese were noted at one time. Large numbers of ducks came in nearly every night for fresh water and feed. During the winter holes were cut in the ice on the pond so that the ducks could have access to fresh water. Throughout the year live duck and goose decoys



were maintained in prominent places to encourage the migrating birds to use the island as a way-station. Grain was displayed at all times, so that any passing birds would find feed upon striking in.

The tern colony continues to flourish. It was for the preservation of this colony of common and roseate terns that the island was originally turned over to this Division to be a wild life sanctuary. The terns began to arrive on the first of May and continued to come until the 15th. They started to nest about June 1. The superintendent reports twice the number of adult birds as last year. The breeding season was favorable, with abundant food, no bad storms, and no inroads from vermin. The terns started to leave the island around the first of August but some lingered until the beginning of October.

On July 4 Laurence B. Fletcher and Dr. Winsor M. Tyler of Boston visited the island and stayed until the following Saturday noon. They banded 2,250 birds, mostly common terns, together with some roseates and 75 herring gulls. A little later the superintendent banded some 500 more terns. From time to time the superintendent has banded black ducks. Three interesting returns were reported this year. One banded by him on February 15 of this year was shot in Labrador on May 24 following; one banded on February 19 was shot on Prince Edward Island October 28, and one banded on February 20 was killed in Little Compton, R. I. on October 23.

Students from the Marine Biological Laboratory, Woods Hole, made their annual summer visit and at another time a group of German, French and Japanese scientists looked over the island.

The stock of cottontail rabbits continues to flourish, though there were some losses of young in the early spring. There were 488 trapped and shipped to the mainland for restocking purposes. Of these 11 died, one was lost in transit, and 476 liberated in the covers.

The quail show a slight but steady increase. We are following this small stock of quail with great interest to see whether they will accustom themselves to the conditions on this outlying island. It is entirely possible that in time a strain of birds will be developed particularly adapted to restocking our larger islands, such as Martha's Vineyard, Nantucket and Tuckernuck.

The work of cleaning up the debris of the old concrete buildings proceeds slowly, but many of the scars are gradually being covered over. Additional fencing was supplied to improve the yards where the duck and goose decoys are confined, and to protect the superintendent's crops from rabbits. Some 50 sections of common drainage tile were sunk into the ground at different points, to make shelter and breeding places for the cottontails.

The caretaker's dwelling had fallen so rapidly into disrepair that extensive work was required. All the stucco was removed from the outside of the building; the boarding, along with wire lathing, removed from the building, and boarding replaced; an intruding corner of the demolished administration building was removed from the living room and the corner of the living room built out and refinished; the building, with the exception of the back shed, was entirely reshingled, replacing the old stucco work; new chimney of tile and brick installed; an entire new roof constructed, and numerous repairs made in the interior, along with painting and repapering.

The boat was overhauled in the spring, and painted.

No trees were planted, but 125 Japanese barberry bushes were set out.

#### *Other Sanctuaries*

The establishment of a chain of large-sized wild life sanctuaries across the State is the surest guarantee of the maintenance of our wild life stock.



The various sanctuaries, large and small, for which no caretaker is employed, are temporarily under the supervision of the Chief Warden, who makes occasional inspection trips throughout the year, studies the needs and carries on such development work as funds will permit. Since the appropriation for this branch of the work is not even sufficient for the operation of the Martha's Vineyard Reservation and the Penikese Island Sanctuary, very little can be done for the smaller sanctuaries. Some 400 wooden frames for posters were made and placed. Bird houses have been planned, some already built, and patterns are being prepared for easy making of others. Seed and food-bearing shrubs will soon be planted in nurseries for later transplanting to the reservations.

Brief statements follow concerning those sanctuaries on which any other development work was done during the year.

*Isaac Sprague Bird Sanctuary (Carr Island).*—As noted elsewhere in this report, a gift of fifty dollars was received from Isaac Sprague, Esq. for development work on Carr Island. This will be used during the coming year.

*Boxford Sanctuary.*—As recorded elsewhere in this report, two additions were made to the Boxford Sanctuary this year—the first, three and one-half acres (the so-called Lake Lot) from Dr. John C. Phillips, which is very desirable for rounding out our holdings. The other comprises ninety-two acres from the Associated Committees for Wild Life Conservation. The Associated Committees has also tendered two parcels containing approximately twenty-eight acres, but up to the close of this report the transfer has not been completed, work on the titles being still in progress. From a small beginning the sanctuary has now grown to 325 acres, and we are led to believe that additional gifts and purchases, without cost to the State, will be made in the future. The reservation was studied in company with a member of the Forestry Division. A considerable area found to be infested by moths was sprayed with arsenate of lead 400 feet each side of the road. Damage from the same cause in other parts of the reservation is serious, and the entire property should be sprayed. The principal needs are cutting of branches to admit light on the new growth, and the planting of food and seed-bearing bushes and trees. A survey was completed of the old area, and the entire reservation fully re-posted. Pheasants from the State game farms were liberated within the reservation.

*Edward Howard Forbush Wild Life Reservation, Hancock.*—All paths leading into the reservation were fully re-posted; trees were re-blazed along the boundaries so far as these are known (a survey of the entire reservation is needed); and posters placed on the southeast and north sides of the known boundary. A large metal poster was made, ready to be placed at the right of way on the South Williamstown road. On two occasions the Chief Warden and the State Ornithologist visited the reservation to plan its future development. Arrangements have been made with a local person to make bird houses and to maintain a general oversight of the area during the winter.

*Watatic Mountain Wild Life Reservation, Ashburnham and Ashby.*—This reservation was fully posted during the year. The Wapack Trail was defined and marked with arrows, and large metal posters placed at each end.

*Minns Wild Life Sanctuary (Little Wachusett Mountain), Princeton.*—The work of posting the reservation was completed during the year. Heavy wires were placed across wood roads and paths entering the reservation; stone walls replaced in small sections; gooseberry bushes removed where they might transmit blister rust. An old spring was located in the woods on the north side, and arrangements made with Miss Lois Fay (who has a life interest in the area) for enlarging it. In addition Miss Fay has supplied for the office files, a complete list of trees and plants on

the reservation, and has set out bird houses near the highway. Pheasants were liberated on the reservation by the Division.

*Reservations under Sections 69-75, Chapter 131, General Laws*

The term for which the Randolph Reservation was established expired November 10, 1929.

A new reservation in Hinsdale and Peru, covering approximately 750 acres, was established for five years from July 1, 1929.

## INLAND FISHERIES

### GENERAL

(Additional details concerning the individual species will be found under Propagation of Fish and Game, and Fish Distribution.)

The conditions affecting the fish life in our inland waters were the most unfavorable noted for many years. The winter did not bring the usual amount of anchor ice and long-drawn-out, sealed-up condition of the ponds. The spring run-off was not particularly heavy, and there were extreme fluctuations in temperature. A relatively hot week in early April was followed by a sudden snow-fall in the middle of the first week of the open season, making a combination not at all favorable to the angler. Fortunately conditions were such that there was no occasion to consider closing the fishing season by reason of menace of forest fires. Early in the summer a drouth condition began to prevail which lasted until late in the fall, which took some toll through the complete drying up of many streams and the reduction of others to a series of pools in which high temperatures and vermin did considerable damage. Many ponds became so low that fish life was seriously threatened, necessitating salvage work, recorded elsewhere. The extent of the losses will never be known, but in the aggregate they are, in all probability, not so large as is generally assumed. All species of wild life adjust themselves to unfavorable conditions with surprising success.

It is fortunate that we were not following a plan of fall distribution of the output of our fish hatcheries, for this year it would not have been practicable. The character of our streams has been so changed by the various agencies of man that these extreme fluctuations in temperatures and water levels are likely to occur more often and become more acute, rather than less so.

It is a great satisfaction to report a large stock of trout available at our hatcheries for the fishing season next spring. We have continued our policy of producing only trout large enough to be caught when planted. While the statement of output shows a liberal production of fingerlings—these were more or less in the nature of a by-product resulting from having a larger stock on hand during the summer from which to select large fingerlings to be reared to yearling size. Some of the fingerlings were planted as the fish were sorted, at intervals, during the summer, and others shipped to the clubs for further rearing.

The fishing in our streams continues to improve. A larger number of trout were taken this year than at any time in recent years, showing that our policy of spring planting of legal size fish is producing results. The total record of fish distribution for the year exceeds, when number and size are considered, any previous output in the history of our hatcheries. As an illustration of the requirements for producing such a stock, it is interesting to point out that during this year our fish were fed 154,396 pounds of pork melts, 87,303 pounds of liver, and 4,493 pounds of miscellaneous food. If we are to raise large fish we must feed them liberally, and this costs money.

Through the operation of our one pond-cultural unit and the activities of the salvage crews we are making as much progress as possible



towards increasing the output of those species suitable for stocking our ponds. We continue to emphasize the need of more pond units and more salvage work, to the end that the production of our pond fishes can be brought up to at least equal the hatchery outputs for our streams.

We again ask our fishermen to consider some restrictions on the present volume of fishing through the ice. We continue to say that it is hopeless to expect to maintain a satisfactory stock of fish in our ponds without some further protection to the stock already there.

#### BROOK TROUT

The first three days of the week preceding the opening of the fishing season were extremely warm. Then came a heavy snow storm, accompanied by a great drop in temperature. The snow remained for about twenty-four hours except in the heavily wooded sections of the western part of the State, where it went off slowly. The remainder of the week was cold and raw and similar weather marked the early part of the fishing season. There was snow water in the brooks, with high waters and conditions generally unfavorable. In fact, throughout all of April and the most of May there was very little ideal fishing weather. Considering the many unfavorable factors the brook trout fishing season as a whole was more than usually satisfactory. A larger number of sizeable fish were reported and more catch limits than has been the case for years.

#### LOCH LEVEN, BROWN AND RAINBOW TROUT

A larger number of yearling and adult brown trout were planted than at any other time in our history. As an increasing number of fishermen study the habits of this fish and learn the tricks of angling for it, the brown trout is sure to increase in popularity. The brown trout and the rainbow are available for restocking some of our larger waters that are unsuitable for brook trout. Increased attention is being given to the rainbow, and a larger number is on hand at the Montague Fish Hatchery than at any other time in years, a start having been made to build up a brood stock of rainbow trout that will match the brood stock of the brown trout now on hand.

#### CHINOOK SALMON

We have continued importation of a limited number of Chinook salmon eggs for stocking a few ponds in which this species thrives. When our hatcheries have been developed so that some of these fish can be carried to the yearling stage, we believe it will increase in popularity for stocking a limited number of our larger completely landlocked waters.

#### WHITE PERCH

The salvage operations at Tashmoo Pond yielded smaller returns than were expected, for, owing to last year's unsatisfactory catch, a larger catch this year was anticipated. While a great deal of interesting discussion has arisen during the year as to the habits of white perch in our coastal waters and ponds connected with the sea, much data remains to be collected on the extent to which any waters are annually automatically restocked by white perch ascending from salt water to our fresh water ponds.

#### PIKE PERCH

A larger number of sizeable pike perch were reported as having been taken this year, than for several years. This illustrates some of the mysteries of restocking. Pike perch can only be planted as newly



hatched fry. Upon such stockings a few years ago the fry seemed to melt away and were considered as a complete loss. In later years enough large specimens were taken to show that at least some of the small fish got by. It is questionable the extent to which this fish will be available for stocking our waters on an extensive scale.

#### PICKEREL

The pickerel continues to be the most popular fish of our ponds, but we note very little increase in the stock, taking all our waters as a whole. Rather the pickerel appears to be slowly declining, both in size and numbers. We do not expect these conditions to improve until there has been a reduction in the present open season. There is no fish which can stand a ten-months open season, and this season extending up to the spawning period.

#### SMELT

The future of smelt fishing can not be contemplated with enthusiasm. Thousands of our fishermen delight in the capture of these little silvery beauties. But the smelt, more than any other species, must always feel the blighting effect of coastal developments, for its breeding grounds on our coast are slowly but surely being wiped out. A few breeding grounds, such as those in the Parker and Mill Rivers, might be preserved for all time, but what remain of some of the former splendid breeding streams appear to be fast disappearing through the construction of barriers, filling in, and pollution.

#### BASS

The bass continues a popular fish in some regions, and in others there is considerable opposition to restocking. We are following our plan of some years ago to stock a selected list of waters with bass instead of making promiscuous distributions. The fishing is steadily improving in many of the waters so selected.

#### HORNED POUT

Public interest in horned pout is increasing, undoubtedly brought about by the larger numbers of such fish distributed by us from year to year. During the year there has been considerable discussion in favor of reducing the present daily catch limit from 40 to 20 fish. Our salvage operations reveal that there are many splendid pouts in our municipal water supplies that will be fine brood stocks if and when they are re-distributed in open waters. An improvement is reported in many of the waters stocked during the last few years.

#### PONDS

##### *Public Rights*

We again call attention to the desirability of restoring the former public rights in all natural great ponds between 10 and 20 acres, which were taken away and vested in the riparian owners by the special act of 1869. From the beginning of the colonies until that date the public had been given the right of free fishing in these waters. These natural great ponds between 10 and 20 acres continue to be the property of the State, but the riparian owners, as matters now stand, have the exclusive right to say who shall fish in these State-owned waters. We advocate that the special act of 1869 be revoked and the complete public rights to these waters be restored.

The county commissioners of Barnstable County have proceeded, under Chapter 254 of the Acts of 1928, to make a taking for the purpose of lay-

ing out a public right of way to Walker's Pond (also called Buck's Pond) in the town of Harwich. Progress has been reported during the year, but up to the present time this right of way, for all practical purposes, including travel by automobile, still remains to be developed.

Pursuant to a petition under the above act the Department of Public Works made a special report to the Legislature (House 155) on the necessity for laying out a right of way to Lake Chaubunagungamaug (also called Webster Lake) in the town of Webster. This was reported into the Senate as Senate 298 from the committee on Harbors and Public Lands. The Senate committee on Counties reported "Ought not to Pass" and it was rejected by the Senate.

As a result of surveys during the year by the Division of Waterways and Public Lands, the status of the following ponds has been definitely established:—

Gould Pond (also called Lost Lake), Brimfield and Holland. Found to be a natural pond over ten acres in area, but less than twenty acres.

Baptist Pond (also called Hart Pond), Chelmsford and Westford. Found to be a natural great pond of over twenty acres.

Wedge Pond, Winchester. Found to be a natural great pond of over twenty acres.

Winthrop Lake, Holliston. Found to be a natural great pond of over twenty acres.

Request was made by us to the Division of Waterways and Public Lands for the survey of a number of ponds, the status of which is in doubt.

#### *Great Ponds Stocked and Closed*

The following-named ponds were stocked under Section 28, Chapter 130, General Laws, and regulations (Form 1) applied which will be in force for the periods named below. These regulations prohibit all fishing in the ponds from November 1 to May 30, and in all tributary streams except between April 15 and July 31. Fishing is permitted only with a hand line and single hook, or a single hook and line attached to a rod or pole held in the hand:

Robbins Pond, East Bridgewater	Nov. 1, 1929 to Nov. 1, 1931
Snipatuit Pond, Rochester	Nov. 1, 1929 to Nov. 1, 1932
Mary's Pond (also called Cary's Pond), Rochester and Marion	Nov. 1, 1929 to Nov. 1, 1932
Snow's Pond, Rochester	Nov. 1, 1929 to Nov. 1, 1932
Winnecunnet Lake, Norton	Nov. 1, 1929 to Nov. 1, 1932
Forest Lake (also called South, Harris, Welch and Youths Pond), Methuen	Nov. 1, 1929 to Nov. 1, 1932

#### *Privately-owned or Controlled Ponds Stocked*

<i>Pond</i>	<i>Town</i>
Arlington Heights Reservoir	Arlington and Lexington
Ashmere Lake	Hinsdale and Peru
Battin Mill Pond (Pearl City Pond; Pond in North Part; American Tissue Pond)	South Hadley
Beaver Pond	Bellingham
Berkshire Pond (Pond south of Berkshire Village)	Lanesboro
Comins Pond	Warren
Crossmans Pond	Warren
Day-Smith Company's Pond (Smith-Day Company's Pond; Pond southeast of Baldwinville)	Templeton
Emery Mill Pond (Rucaduck Pond)	Walpole



<i>Pond</i>	<i>Town</i>
Foundry Pond (Factory Pond No. 21; Pond south of Cocasset Pond)	Foxboro
Flints Pond (Mill Pond; Upton Pond; Swains Pond)	Tyngsboro
Furnace Pond (Moose Brook Pond)	Hardwick
Gardner Falls Reservoir	Buckland and Shelburne
Golden Gate Pond (Hollow Pond; Factory Hollow Pond; Puffers Pond)	Amherst
Hoosac Reservoir (Cheshire Reservoir)	Cheshire and Lanesboro
Harts Pond (Sunset Lake)	Great Barrington
Hillside School Pond (Cook Pond)	Marlborough
Hatch Pond	Stockbridge
Island Pond (near Beaver Dam Pond)	Plymouth
Knife Works Pond (Hammershop Pond; Lothrop Pond)	Sharon
Linwood Pond	Northbridge
Morses Pond (Pond north of railroad)	Douglas
Manchester Pond (Pond south of Robinsonville)	Attleboro
Mill Pond (Pond southeast of village; Hadley Pond; Hadley Mill Pond)	Hadley
Manchaug Reservoir	Douglas and Sutton
North Hadley Mill Pond (North Hadley Pond; Pond east of North Hadley)	Hadley
Nashua Reservoir (Ballou's Reservoir)	Ashburnham and Gardner
Pout Pond	Uxbridge
Parkers Pond (Pond at West Gardner)	Gardner
Pelham Lake (Rowe Pond)	Rowe
Powder Mill Pond	Barre
Reservoir No. 2 (Number 2 Pond)	Buckland, Conway and Shelburne Falls
Reservoir No. 3 (Number 3 Pond)	Buckland and Shelburne
Reservoir No. 4 (Number 4 Pond)	Buckland and Charlemont
Rowe Mill Pond	Rowe
Red Bridge Pond	Ludlow
Round Meadow Pond (Merriams Pond)	Westminster
Reservoir at Town Line (Phillipston Reservoir; Mill Brook Pond—this is not the reservoir which is a water supply for Athol)	Athol and Phillipston
Reservoir Pond (Braintree Dam Pond; City Reservoir; Quincy Reservoir)	Braintree
Russells Mill Pond	Plymouth
Rocky Pond	Boylston
Sodum Pond (Chaffin Pond)	Holden
Snow's Pond (Muddy Brook Pond)	Ware
Saxonville Pond (Saxonville Mill Pond)	Framingham
Silver Lake	Athol
Saw Mill Pond	Sharon
Tripp Pond (Pond west of center)	Hudson

The following privately-owned ponds were stocked on agreement by the owners to permit the Division, in future, to take an equal number of stock from the resulting increase:

Leach Pond, Easton and Sharon, on the property of Oakes Ames, adult crappie.

Crane Estate Pond, Falmouth, yellow perch adults.

Pine Lake (Cooley Pond, Granville, located on property of Ralph B. Cooley, Granville, adult blue gills and adult crappie.



*Breeding Areas in Great Ponds*

Upon petition from the town of Harvard under Section 28-a, Chapter 130, General Laws, received during the last fiscal year, the following described portions of Bare Hill Pond, in the town of Harvard, were set aside as a breeding area for food fish of all species, for five years from December 1, 1928:

(No. 1) That portion lying west of a line drawn from the southerly extremity of Turner's Point (so-called) to the northern extremity of Greeman's or Minister's Island (so-called) following the westerly shore of said island to its southwestern extremity and thence westerly to the nearest point on the mainland known as the Clinton Shore.

(No. 2) That portion lying south of a line drawn from the northern extremity of Warren's Peninsula (so-called) and running in a south-westerly direction to a large boulder on the mainland known as Bennett's Rock.

The regulations are as follows:

"No fish of any species shall be taken from said waters without the written consent of the Director of the Division of Fisheries and Game—provided that employees of the Division may take fish for re-stocking purposes."

Violation of the regulations carries forfeiture of license and fine not exceeding twenty dollars.

We regret that more action has not been taken under the provisions of the above act, providing that the selectmen of towns may petition the Division to set aside breeding areas in great ponds. We believe that this is in line with the best administration of such waters.

*Great Ponds Leased for Fishing Purposes*

The lease of Chilmark Pond running from March 1, 1925 to March 1, 1930 was cancelled on December 1, 1928 for failure on the part of the lessees to pay the annual rent. Application for renewal of the lease was made on September 11, 1929. The applicants were notified that before the matter could be considered the arrears of rental under the previous lease must be paid.

Request was made on September 15, 1929 for the renewal of the lease of Tisbury Great Pond when the existing lease (running from January 1, 1925 to January 1, 1930) should expire. No action could be taken, however, since the Director's authority to lease the pond (conferred by Chapter 39 of the Acts of 1919) does not extend beyond January 1, 1930. On petition of the lessees a bill was entered in the Legislature to extend the Division's authority to lease this pond.

*FISHWAYS*

No new fishways were installed in our coastal waters during the year. The principal coastal streams, with the exception of the Parker River, now have fishways around all important barriers.

In 1922 local sentiment was developed in favor of restoring the fishways in the Parker River at points where, at some time in the past, such fishways had existed, together with the construction of additional ways on new dams. The Division investigated the conditions and caused plans to be made of proposed fishways at some of these points. However, public sentiment was not sustained, and no further action was taken. During the past two years interest in the fishways has revived. The Parker River system was carefully studied during December, 1928 by our former biologist, Dr. David L. Belding, and Mr. George M. Besse of Wareham. The latter has had many years of practical experience in the construction of fishways over obstructions on coastal streams, in order to build up the alewife fisheries which he has leased

from the towns having control. Both Dr. Belding and Mr. Besse filed reports of their investigations with the Division.

A hearing was held in Newburyport by the Commissioner and the Director on May 8, at which the proponents for the installation of the fishways and those opposed, were given a full hearing. The sentiment appeared to favor the construction of the fishways, providing that it could be done without involving such costs and loss of water power as would seriously injure the industries located on the river. Various means were considered of financing the construction of the fishways.

After the hearing the Commissioner and the Director arranged for Mr. Besse to go over the dam sites once more with Mr. Michael Cashman of Cashman Bros. Co. of Newburyport, contractors, in order that Mr. Cashman and his company could make up plans embodying the types of fishways recommended by Mr. Besse. After some delay this was done and plans with estimates of costs were submitted to the Division by Mr. Cashman covering the construction of fishways at the three principal dams. The commission to revise the game and inland fish laws on November 11 held a conference with all parties in interest, to consider the entire situation and more particularly the method of financing the construction of the fishways. As a result of this conference it was agreed that a special bill would be filed in the next legislature, asking for an appropriation out of the general tax levy for the construction of the ways.

### POLLUTION

Certain instances of the passage of trade wastes into our streams were reported. The Department of Public Health has generously assisted us in making examinations and recommendations for the improvement of conditions at these points. All such cases have been taken up with the parties responsible for the conditions, in the hope that through friendly negotiations improvements will be made.

## PROPAGATION OF FISH AND GAME

### FISH HATCHERIES AND GAME FARMS

#### *General*

*Fish Hatcheries.*—At the fish hatcheries we have continued our policy of the past few years of putting all buildings into good repair. As fast as the wooden dams built in earlier years go into decay they are being replaced with concrete. We are continuing our policy of shipping out trout at least six inches long, or better. It is our intention to limit the production of such fish from the hatcheries to between 250,000 and 300,000, including brook, brown and rainbow trout. In order to have a reasonable stock from which to select the fingerlings each year to be carried through the following winter for liberation in the spring as yearlings, we will always have a certain number of fingerlings to be discarded annually. It is not our intention to enlarge the fish hatcheries during the next few years beyond the point where we can have all the facilities necessary to properly handle brood and rearing stocks of the present size. Every fish hatchery should have ample pool room in which to raise fish of all sizes in order to deal with disease if it appears, and to rest all pools for a portion of the year as a protection against disease. It is along these lines that we will continue to develop our fish hatcheries. There is great need of rearing stations for the handling of trout in Berkshire County and in Essex County, but no funds will be expended in this direction until suitable locations have been discovered. This involves not only a large volume of cold water, but water of a suitable quality.

At several of the fish hatcheries experimental work was done on automatic feeders. This was of two types. In both experiments a glass jar was used from which the bottom had been removed. A wooden plug was driven into the neck of the bottle, through which a hole had been bored to



take a petcock. The inverted jar was then filled with ground-up hog melt, and the contents allowed to drip slowly into the pools. It was found advisable to so adjust the water conditions that the particles of fish food would drop into a quick current and be carried out over the pool. These jars were set up at the intakes to some of the rearing pools. The other line of experiment employed the same apparatus set up in a hatchery building, with long, narrow troughs leading from the automatic feeder to several of the wooden troughs in which the young fish were held, so that the fish were fed automatically from about the time that they started feeding. We are not yet prepared to say to what extent this system is an improvement over the old practice of feeding at intervals by scattering the food in the rearing troughs or pools. The principal tests will be—whether the methods result in any economies in the amount of food required and in stimulating a more rapid growth of the fish.

*Game Farms.*—From the time the rearing season started until late in the fall the drouth conditions resulted in the almost complete absence of rain. The general climatic conditions, while unfavorable for growing green food, were the most favorable experienced in the history of our game farms for the production of birds, for there was an absence of the cold, rainy periods with which we have had to contend during nearly every rearing season.

Massachusetts stands alone in the field of pheasant rearing in that for some years it has used the incubator-brooder-house system without any brood hens on the farms. There is considerable misunderstanding throughout the country as to the nature of this system, and therefore it may be helpful to explain it at some length. We have four game farms, three of which operate with a brood stock of 400 pheasants, while at the fourth (Ayer) we are gradually working up to a brood stock of the size of the other farms. At Ayer we also maintain an "egg stock." By this we mean a flock of pheasants maintained solely for the production of eggs for shipping to individuals and to local clubs and chapters of the Izaak Walton League, for hatching. By this plan we are giving them the same quality of eggs as those used at the game farms. None of the eggs from this egg stock are used at the game farms. Each year after the eggs are collected some of this egg stock is liberated, and it is built up each year by additions in order to keep the blood lines as strong as in the brood stocks. The four game farms are located at different points in the State, as appears from the reports on the individual stations following. The soil at all these farms is of a rather light, sandy nature, and not the best quality of farm land for the growing of hay crops. However, by careful treatment we are gradually improving the productiveness of this soil. At the Marshfield and East Sandwich farms there is a natural floor covering of brush, including blueberry and bayberry bushes, which supplies considerable protection and food. There are all sorts of climatic conditions, from the intense cold and deep snow in the western part of the State to the milder climate of the coastal region in which the Marshfield and Sandwich farms are located.

We are gradually surrounding these farms with guard fences. These fences are built of 4 x 4 western pine posts placed on ten-foot centers, with that part creosoted which goes into the ground. At the surface is placed a six-inch, heavily creosoted board; above this, a painted one-foot board; above that, a two-foot strip of one and one-half inch mesh hexagonal wire; and above that, a five-foot strip of two-inch hexagonal wire. The fence is further stiffened by a strand of heavy wire running from post to post over the top. We do not claim that this is the best type of guard fence that can be built, but when working with limited funds the essential thing is to get a fence that for all practical purposes will keep out a substantial amount of ground vermin. No fence will protect against overhead vermin.

The incubator houses and all of the other buildings are kept outside the



guard fences for convenience of operation. There is no particular type of incubator house. At the Wilbraham Game Farm we use a portion of the basement of a barn; at Marshfield, the basement of another building; at Ayer and Marshfield there are two brooder houses of the usual type. There is no standardized equipment as to incubators. At Marshfield and Sandwich the Prairie State is used; at Ayer, the Charters; at Wilbraham, the Buck Eye, with one Hersom and one Prairie State. Owing to the lack of funds we have not yet experimented with the electric incubator, but we believe that it has larger possibilities than any we are now using. There is no standard practice among the superintendents as to the method of operating the incubators. Each man follows his own system, with the result that there are certain variations in practice. Our average hatch is about fifty per cent of all the eggs set, for the reason that we operate the incubators as long as it appears advisable to take eggs from the brood stocks (the last eggs often being set in July). This is also made necessary by the small brood stocks we are carrying and our limited facilities for caring for many young birds at one time. We hope in years to come to be able to carry larger brood stocks, hatch more eggs at a time, and discontinue the collecting and hatching of eggs at an earlier date. We believe this would increase the percentage of our hatch and be much more beneficial to the brood stocks by releasing them from the present intensive production.

The general practice is to start the incubators with a heat of 101 to 101½ degrees (with the top of the bulb of the thermometer on the level with the top of the eggs in a tray). The heat is gradually stepped up to 103, at which point it is carried until the hatch starts. It would not be advisable to attempt to go into all the details of the individual practices of the four superintendents in manipulating the incubators. However, we believe that the future holds great possibilities for developments in hatching of pheasant eggs through better adjustment of the moisture, through maintaining the eggs on the hatching tray with the small end down, by use of the device by which the eggs can be turned a number of times each day, as well as through better control of the heat and ventilation. In this direction there is a great opportunity for study and experiment in the future.

The chicks are allowed to remain in the incubators until the hatch is completed and all are dried off. They are then transferred to the brooder house.

Three types of brooder houses are used. At the Marshfield Game Farm there is a small brooder house 100 feet long, divided into eighteen compartments and heated by a hot water system. Here the chicks are started and later transferred to a larger brooder house 200 feet long, also heated by hot water. At the East Sandwich Game Farm there is one brooder house fifty feet and another eighty feet long, similarly heated. At both of these farms there are additional brooder houses 20 x 10 feet, heated by oil-burning or coal-burning brooder houses. At the Wilbraham Game Farm all brooder houses are heated by oil-burning brooder stoves. All of the brooder houses so heated and mentioned at this point are stationary, with concrete floors, and covered pens adjoining. At the Ayer Game Farm all of the brooder houses are 10 x 10 feet each heated with an oil-burning brooder stove, and all these houses are portable. In front of each house is a series of V-shaped rearing pens which are lightly built, and portable. When a brooder house is once placed on location the portable pens are revolved around it in order to give the young birds fresh ground at intervals.

At all farms the birds are carried under wire in heated brooder houses until they are about 4½ weeks old. From here they are shifted for about a week and a half into pens without heat. At the age of six to seven weeks they are wing-clipped and turned into large rearing fields, where they are carried, wing-clipped, until at least twelve weeks of age.

It is at this point that shipping begins. The stumps of the quills are pulled from the wings and the birds are then shipped to individuals and clubs, who at their own expense provide the pens, labor and feed to carry them through the winter to be liberated in the spring as adults. Practically the entire output of our farms during the last year and this year have been so handled.

Game breeders are pretty generally convinced of the necessity of moving from point to point in order to have their birds each year on clean ground. To that end we are working in the direction of having eventually most of our brooder houses, rearing pens and yards of such construction that they can be easily moved. To this end we are experimenting with brooder houses of about 10 x 10 feet with walls 6 feet high and heated with old-burning brooders. The portable rearing pens to go with such houses as used at the Ayer Game Farm are entirely practicable. This year we have adopted the steel post for the construction of rearing fields inside of guard fences. These fences will be of hexagonal wire from 6 to 7 feet high. It is entirely possible for a bird now and then to get from one pen into another by this type of fence, but that makes little difference, so long as the farm is surrounded by a guard fence. Carrying the birds wing-clipped simplifies the plan. Such fences can be quickly moved to other parts of the farm and the ground cleared for plowing and planting. We now have under consideration using steel posts and wire fences 6 to 7 feet high to set up uncovered yards around our portable brooder houses. No practical difficulties appear in clipping our birds after the third week, and before that age it is doubtful if many would try to get over a fence so high. It may not be necessary to start clipping the birds until they are even older, for if a few should escape from time to time they would still be inside the guard fence and quite easily caught up. The essential thing is portability and a reasonable control over the birds.

Much of our system is predicated on carrying the birds wing-clipped for shipment to be wintered, as contrasted to the plan in other states of liberating the birds direct from the rearing fields. By the foregoing system our birds, before shipment, are given at least six weeks of life in the open with no protection from the weather, and in natural cover. If the birds are to be shipped fully winged, they must be caught up about the seventh week or many of them will escape. If they are to be held beyond the seventh week before liberation as fully winged, they will have to be held in covered yards for the remainder of the growth period; which raises complications in the actual carrying of the birds and the overhead cost of large covered holding pens.

In the feeding of birds the opinion has prevailed in some quarters that we have some secret formulas for feeding our birds which we are reluctant to make public. Our methods of feeding are no more standardized than are our methods with the incubators. Every superintendent is permitted to carry out his own ideas, and there are no two who follow the same formulas from start to finish. We use practically the same methods and formulas employed generally throughout the country, that is to say, hard-boiled egg and any one of the standard mashers to start with, while giving the birds an abundance of green food. As the birds increase in size the same amount of egg content is retained, but a larger bulk of the other food. The egg is usually discontinued when the birds are about four weeks old. Most of our superintendents have come to regard highly the Chapin Kernel and are feeding the "Lay-All" almost entirely after the birds have reached the age when the egg is no longer added. Some of our superintendents are using this food entirely at the present time to carry through stocks of young birds still on hand, and the brood stocks. At two of our farms practically no scratch grain or whole grain is now being fed.

During the past two years we have hopper-fed all our birds, both young and old, to an increasing extent. We find it is entirely practicable and



makes for economies and cleanliness. We have used hoppers on very small birds, before which we keep a dry mash feed most of the time. We have not yet perfected a type of hopper for the moist food.

The incubator-brooder system necessitates the feeding of large quantities of green stuff. For this purpose our superintendents use a variety of things. Lettuce is most satisfactory, but in the early part of the season is fairly expensive. However, as time goes on we will be growing larger quantities on our own farms. Spinach is also fed, as well as kale, and later in the season, cabbage. Most of this is crammed into net bags and suspended to a height where the birds must work for it; but we also have used, very successfully, a type of feeding rack in which the green stuff is placed off the ground and under a cover which protects it from the snow.

Our system requires a larger amount of feed for the birds than is the case in the range system, but we believe there are advantages which offset this cost. The compactness of the system makes it possible to operate with small working forces.

One of the great problems in the system has been cannibalism among the young birds. This we have almost entirely met during the past year by smearing the birds in the pen (whether they need it or not) with one of the commercial smears which would discourage this practice.

Our records show that we hatch about one-half of the eggs put into the incubators and raise about one-half of the chicks with which we start. We are hopeful that, as time goes on, this spread can be narrowed up. While we make no claim that this system is the solution of the rearing of game birds, yet we are heartened to push forward from the evidence coming to hand that the system is more and more being considered by the game breeders of the country. While the foregoing makes no attempt to cover many interesting details it is brought forward in the hope that the public will more fully understand its practical application.

(See report of the Wilbraham Game Farm for a somewhat detailed account of the hatching and feeding practices followed there).

### *Ayer Game Farm*

The winter months were spent in an intensive construction program. Breeding and rearing pens were constructed in sectional form, to be assembled in the spring. Ten 10 x 14 ft. breeding pens of a new type, 36 rearing pens, intercommunicating, apex type, 8 x 10 in size, and 9 nursery pens of similar type and size, but covered with roofing paper for protection from the weather, were completed. Five new 10 x 10 ft. portable brooder houses, sheathed and roofed with Celotex were built, and the 7 old-type wooden brooder houses were renovated and remodelled. Ten oil-burning brooder stoves were installed. In August work was started on two large wintering pens, one for the brood stock and the other for the egg stock. These pens were completed in October. They are each over 900 feet in circumference, surrounded by an eight-foot fence, and contain natural cover in the shape of alder and birch thickets, evergreens, low brush, swale, etc. The old duck pond was dug out and a low dam built across the lower end to enlarge its capacity. The run-off is carried across the new brood stock yard to provide a constant stream of running water for the birds. This pond, when completed by further excavation, will be utilized in pond fish culture. In it were placed this year 750 fingerling blue gills and 750 fingerling crappies from the Merrill Pond System.

The superintendent's house was improved by the installation of a double window in place of a single one in the living room, door openings were rearranged to improve the heating conditions, and two rooms re-decorated.

The construction of a guard fence is now in progress to enclose the winter breeding and rearing area now in use. This calls for about 1,700 ft. of eight-foot guard fence.



A number of hoppers were constructed for use in the breeding and rearing yards.

No extensive reforestation work was done this year, though a small number of swamp pinks and 50 black walnut seedlings were set out.

*Pheasants.*—This year the Ayer Game Farm was operated both as an egg-producing station (to supply eggs to applicants for hatching) and for a station for the production of pheasants for distribution.

The year opened with 231 adult pheasants on hand as brood stock and 548 adult pheasants as egg stock.

Of the 231 adult brood stock 2 were lost prior to the breeding season, leaving 229 on hand at the beginning of the laying season. The birds were mated in late March in the ratio of 8 hens to a cock. From this stock, 9,684 eggs were collected and 661 eggs from the egg-stock birds added in partial replacement of brood-stock eggs sent to applicants prior to the receipt of incubators, making 10,345 eggs handled. Of this total 2,230 were distributed to clubs (the incubators were not received in time to set the first eggs collected), 3,393 were used for feeding chicks, and 4,722 were set in incubators. 2,746 were infertile in incubators, contained dead germs, or were otherwise lost (included in this figure are 476 fertile eggs which were destroyed when accident occurred to the heat regulating device in one of the incubators) and 1,976 hatched. To these were added 105 birds hatched from eggs collected from the egg stock, making a total of 2,081. Of these 599 were distributed for wintering, 1 for liberation, 1,025 were lost, and 456 remain on hand November 30.

Of the 229 on hand at the beginning of the breeding season 57 were lost, 2 sent away for scientific investigation and 11 distributed, leaving 159 on hand, to which were added 11 transferred in July from the egg stock, making a total of 170 on hand November 30.

The 548 adult egg stock birds were reduced by the loss of 12 and distribution of 200, to 336. To these were added 100 received from the Marshfield Game Farm (10 cocks and 90 hens) and 10 cocks from the East Sandwich Game Farm, making 446 on hand at the beginning of the laying season. From this stock 12,716 eggs were collected. 11,031 were distributed to applicants for hatching, 824 used for feeding chicks, 661 used for partial reimbursement for shipments of eggs from the brood stock prior to the receipt of incubators, and 200 set. 95 of these were infertile or contained dead germs, and 105 hatched and were transferred to the birds reared from brood stock eggs.

Of the 446 on hand at the beginning of the laying season 92 were lost, 343 distributed and 11 were added to the brood stock birds in July.

#### *East Sandwich Game Farm*

Fifty additional breeding coops (10 x 6 x 6 ft.) were constructed for quail work; also 10 brooder boxes for use with Putnam brooder stoves in work with young quail. One hexagonal brooder house was constructed of Celotex, equipped with a large Newton coal-burning brooder, so arranged that each side represented a division inside the house and brooder, and also a V-shaped yard outside so that a flock of quail utilizes each division. To hold young quail portable fences were constructed with fine mesh wire and one-foot wide base boards. These can be set up to connect with the small brooder boxes mentioned above, in order to have a wedge-shaped yard. The whole fence is held up with steel posts.

A temporary guard fence was constructed around the quail breeding coops with base boards, wire and steel posts, to the height of 7 feet so that all could be removed as soon as the permanent outside guard fence is finished. The northerly side of this temporary yard is being constructed to the standardized fence (3 x 4 fir posts) and is the first section of the permanent guard fence that will be continued until it encloses a large area devoted to the whole quail work.

Considerable time was put in repairing the old setting boxes used for bantams. This season ends their usefulness.

In connection with the pheasant work considerable new area was enclosed with yards, as follows. A large open yard (called the railroad yard) on the westerly side of the drive and northerly side of the railroad encloses 90,800 square feet of upland and marsh land with some trees and cover, besides open land. This is divided in halves by temporary fences and steel posts. Inside this area three houses were erected and open yards made for each house. Each yard is 60 x 20 feet. The houses had previously been used as winter quail houses, being 6 x 8 feet and shed roof. In these were placed Simplex brooders.

Another open yard (known as the bog yard) lying easterly of the workshop and taking in an old, grown-up cranberry bog) as well as open land and bushes, was constructed. This yard covers 84,000 square feet of area and is divided into a north and a south half.

A smaller open yard enclosing the workshop and lying between the bog yard and the old covered winter yards, was constructed (known as the shop yard). It encloses 21,600 square feet of area, mostly open land.

Another open yard (known as the hardening yard) lies north of and adjoining the old chicken brooder houses. It encloses 35,000 square feet of mostly grass land, and is to be divided this coming season into small yards for hardening the young pheasants as they come from the brooders.

A group of portable yards was built, each 24 x 75 feet, on a large buckwheat area south of the No. 2 open yard next to the Fish property, for 6 to 10 weeks old pheasants. These were later removed, as planned.

No trees were planted this year.

Considerable brush and trees were removed for future fence building.

The gift of three acres of land (known as the Van Woert property) from the Federation of the Bird Clubs of New England, Inc. was a valuable addition to our holdings at this station, so that now the State holdings extend northerly to and borders on the State highway.

*Pheasants.*—The year opened with 56 adult pheasants not brood stock, and 550 adult brood stock birds on hand (a recount added 1 to the previous inventory of adults not brood stock).

Of the 56, six were lost and 50 distributed for liberation.

Of the 550 brood stock 10 were sent to the Ayer Game Farm, 43 were lost, 101 distributed for liberation, leaving 396 on hand at the beginning of the laying season. From this stock 13,657 eggs were collected and set in incubators. 5,132 proved to be infertile or contained dead germs, and 8,525 hatched. Of these 4,643 were lost, 852 distributed for liberation, 2,735 distributed for wintering, 130 held for later distribution, and 165 held for the 1930 brood stock. This makes a total of 295 on hand November 30.

Of the 396 adults on hand at the beginning of the laying season 58 were lost or escaped, 100 were distributed for liberation, and 238 are on hand November 30.

*Quail.*—The year opened with 162 adult quail on hand, to which were added 18 wild birds, making a total of 180. This number was reduced through the death of 27 (from natural causes), the loss (unaccounted for) of 3, and the distribution of 26 extra cocks, to 124 by the beginning of the mating season.

Fifty-eight mated pairs were placed in breeding pens, and 8 extra males held for emergency. From these pairs were collected 1,540 eggs, and 100 eggs were purchased from the Virginia State bird farm making a total of 1,640 eggs that were set, mostly under bantams, though a few were placed in an incubator for experiment. Of the 1,640 eggs incubated 160 were broken, 711 held dead germs or were infertile, and



769 hatched. Of this number 206 were raised and are on hand at the close of the year. All are being held for breeders next season.

Of the 124 adults on hand at the beginning of the breeding season 12 were killed by rats or weasels, 9 escaped, 1 was distributed, 21 died, and 81 remain on hand November 30.

In comparison with last season the quail laid much better, and no female refused to lay at least some eggs, so that some of the birds that did not lay in 1928 did so this season. This may be accounted for principally by the fact that the breeding pens were placed much farther apart, contained considerable natural cover, and no wooden shelter was placed inside the pen for the birds to sit upon and look forward for a jump and a fly when the attendant came near, which would start the birds in all the other pens to jumping. These conditions being absent the birds appeared to be very much less nervous and therefore laid better. The first eggs were noticed on May 13, and the last one was on August 28. The best layer produced 53 eggs and the poorest 3. There was much trouble by bantams deserting their nests, which resulted in destroying the germs in the eggs or weakening them. Some eggs also were destroyed by vermin, and some brooding bantams persisted in breaking and eating the eggs.

Most of the young quail were placed in brooders of a small type that were heated by kerosene heaters. The latter were not always reliable. A large coal-burning brooder of standard make was utilized in an eight-sided building and so divided that 8 flocks could be mothered at one time. The 8 yards radiated from this building forming triangular yards, making it easier to drive the birds inside when necessary. Further experiment is necessary to perfect it.

The losses were large for several reasons, cannibalism being perhaps the greatest. It was ten times as bad as the worst case of cannibalism ever experienced at this farm among young pheasants in brooders. It would start with day-old birds, usually with vent picking, toe picking and sometimes with bill picking, either of which appeared to be such a nervous shock that the birds refused to eat and usually died within a few days. The ointment used for young pheasants and chickens helped somewhat, but evaporated too quickly for best results, so that preventive measures were more satisfactory. These consisted in keeping the birds in smaller flocks, darkening the brooders, and occupying the birds otherwise. Cannibalism once begun in a flock of as many as fifty young quail in a brooder is most disastrous. A flock of 15, or 20 at the most seems to be the limit of safety. This being so, it can be readily seen that in comparison with our system of rearing young pheasants with 150 to 250 in a flock under one brooder, it means that at least ten times as many brooding units will be required for the same results, although of smaller size. Seldom, if ever, do any signs of cannibalism appear among the bantam-raised quail.

### *Marshfield Game Farm*

The remodelling of the small brooder house was completed and the interior painted. In the large brooder house many of the windows were replaced, floors repaired, and the building raised. An additional large valve was installed to improve the control of the heating system. Both brooder houses were painted.

Some of the surface was removed from the yards in front of the brooder houses, then the surface heavily limed and covered with a layer of clean, fresh sand. The five brooder houses on the hill were equipped with oil-burning brooder stoves. Thirteen covered rearing yards were built on the north side of these brooder houses on the hill. Eighteen covered runs with cement floors were placed in front of the small brooder houses. The large rearing yards in front of the small and large brooder houses were



re-covered and sub-divided and extended to be "hardening yards" for carrying the birds without heat until they could be released, wing-clipped, in the rearing fields.

A yard was constructed across the swamp at the northerly end of the breeding pens, as a run for the brood stock, in order that they could be removed from the breeding pens and given this range immediately after the laying season.

A portion of the swamp and upland lying inside the guard fence was sub-divided into rearing fields by the use of steel posts and wire netting.

The orchard rearing field was further sub-divided by the use of steel posts and wire netting.

A concrete flume and tide gate was constructed at the outlet of the brook for the purpose of draining the additional swamp land on the easterly side of the farm in preparation for its use as rearing fields.

Seventy self-feeders were installed in the breeding pens and about 15 built (another style) to use in the outside yards and in the brooder houses.

A new open yard was built from the golden pheasant pen to the flume. The dog pen was covered and sub-divided.

No reforestation was done this year, though 300 trees were transplanted.

A large piece of land (loaned by the superintendent) was plowed and laid down to winter rye for feeding in the spring.

*Pheasants.*—The year opened with 871 adult pheasants, not brood stock, and 555 brood stock adults, on hand.

Of the 871 there were 175 lost or killed as cripples, 134 distributed for wintering, 421 for liberation, and 141 were sent to the Wilbraham Game Farm (130 hens and 11 cocks).

Of the 555 brood stock birds 26 were lost prior to the breeding season, 21 distributed for liberation, 100 sent to the Ayer Game Farm for egg stock (90 hens and 10 cocks) and 408 were on hand at the beginning of the laying season. The birds were mated 1 cock to 5 hens. From this stock 16,433 eggs were collected, of which 183 were used for feeding chicks and 16,250 were set in incubators. 9,519 were infertile in incubators or contained dead germs and 6,731 hatched. Of these 2,520 were lost or killed as cripples, 444 distributed for liberation, 36 held for later distribution, 3,613 distributed to the clubs for wintering, and 118 are being held for additions to the 1930 brood stock.

Of the 408 adults on hand at the beginning of the breeding season 41 were lost, 124 distributed for liberation, and 243 remain on hand November 30.

93 birds (1929-hatched) were purchased. Of these 3 were lost, 10 distributed to clubs for wintering, and 80 are on hand for additions to the 1930 brood stock.

At the close of the year there are on hand the 198 birds (118 plus 80 above) of the 1929 hatch and the 243 adults mentioned above.

### *Wilbraham Game Farm*

During the year there were 1,180 feet of guard fence built around the orchard east of the farm house, and the area then divided by temporary fences into four sections, which are being used as holding pens for the young birds. There were 1,578 feet of fence built around the lot west of the farm house. This is now being used as a wintering pen. Posts and baseboards were put up ready for the wire on 5,830 additional feet of fence.

The three large chick brooder houses were sheathed on the inside to a height of two feet, rounding off all corners. Above this was fastened one-inch mesh wire to keep the birds from roosting on the ledges made by the sheathing. The old trap doors were removed and new, ground-level doors installed; roof ventilators built and installed in each house; and cello-

glass put on the outside screen doors of each house. The fifteen coal-burning brooders in these houses were replaced with fifteen Simplex oil-burning brooders. The covered yards attached to these houses were dug, limed with air-slaked lime and covered with sand to a depth of four inches. The windows in these houses were changed so as to open for ventilation without drafts.

Twenty of the new type breeding cages were built and, together with some of the old cages, placed on new ground for the 1929 brood stock. Water pipe was laid and automatic drinking fountains installed in the holding pens, as well as in all of the brooder houses (with the exception of two of the large baby chick brooder houses).

The small tractor was replaced with a second-hand Fordson and some farm machinery was added.

During the spring twenty-two acres of land were cleared of brush, the stumps pulled, and the land plowed, limed and seeded—18 acres to rye, two to oats and clover, one and one-half to buckwheat, and one-half acre to vegetables. This land was again plowed during the fall, when eighteen more acres were cleared, plowed and all seeded to winter rye. This makes about forty acres under cultivation.

In continuation of the reforestation program 500 trees were set out.

*Pheasants.*—The year opened with 196 of the 1928 brood stock pheasants on hand in the quarantine yards. 21 were lost, 26 autopsied, and the remaining 149, which proved tubercular, were cremated on scientific advice.

The year opened with 389 brood stock birds on hand. To these were added 141 from the Marshfield Game Farm (130 hens and 11 cocks) making a total of 530 for the 1929 brood stock. During December and January they were fed twice each day, wet mash in the morning and scratch feed in the evening. About the middle of February a combination of Chapin Lay-all Kernels and scratch feed was fed. This was fed in hoppers so it would be accessible to the birds at all times. After feeding this for a short time it was noticed that the birds preferred the Kernels. We therefore decided to try feeding them on Kernels exclusively, and found they were relished by the birds. We fed the Lay-all Kernels through the breeding season, and found that the birds came through the breeding season in better plumage and the hens with fewer injuries from the cocks. This can be accounted for in two ways,—the Kernels may have checked the moult, or, as this was such an exceptionally dry season, the feathers on the hens' backs were subjected less to the matting from rain, resulting in fewer injuries from the cocks. In the course of the breeding season this brood stock was decreased by the loss or escape of 49, and the distribution of 72, to 409 at the beginning of the laying season. These birds were mated six hens to each cock, in individual pens. 17,533 eggs were collected, of which 292 were broken, 957 used for feeding to chicks, and 16,284 set in incubators. Our method of hatching is as follows. Three days before putting eggs in an incubator the egg compartment is disinfected, thermometers placed on the egg trays, the water tank filled, the oil tank filled with fresh oil, and new wicks inserted in the burner. With the ventilators open to allow the fumes of the disinfectant to escape, the lamp is lighted and a careful watch is kept for the first twenty-four hours, so as to adjust the heat to the hatching temperature of 105 degrees. At this time the ventilators are closed. Again the machine is carefully watched to see that it holds an even temperature. The eggs are then placed in the machine, and after closing the egg compartment it is not disturbed again for twenty-four hours. The egg trays are then removed, the eggs turned twice every twenty-four hours, and cooled once each day, up to the twenty-first day, or until the first chipped eggs are noticed. The egg compartment is then closed and the ventilators opened. The machine is not disturbed again until the hatch is completed. The length of time necessary for cooling the eggs depends on the temperature of the incubator cellar.



With a cellar temperature of 65 degrees the eggs are cooled for five minutes each day during the first week. From then to the twenty-first day they are cooled for ten minutes each day. As most of our hatching is done during midsummer it is necessary to supply moisture. To do this the incubator cellar floor is sprayed with a hose twice each day. This also tends to keep down the temperature in the cellar. The eggs are sprayed with warm water once every forty-eight hours for the first fourteen days, and again on the twenty-first day.

Of the 16,284 eggs set in the incubators 9,084 were infertile or contained dead germs, and 7,200 hatched. Our method of handling the chicks is as follows. In setting the incubators it is planned to have three of them hatch on Friday or Saturday of each week, so as to have enough chicks to fill one brooder house of five brooder compartments, each compartment to receive 150 chicks. Having three of these houses we plan to fill one each week. At the end of the third week, the chicks are moved from the first house to the intermediate houses. This moving is always done on a Monday, and as the chicks hatch on Friday or Saturday, there are four days in which to disinfect the house for the next lot of birds. To do this the stoves are shut off, the sand and droppings are removed, the windows closed, and the interior sprayed with a ten percent solution of formaldehyde. The house is then left closed over night, after which the windows are removed, and the interior, including the floors, whitewashed and left undisturbed until the next day, when fresh sand is spread on the floors and the stoves relighted. This plan was followed with all of the houses throughout the rearing season.

Before placing the chicks in a brooder house the stove is regulated to give 90 degrees of heat at fifteen inches from the base. A screen of cellar wire fifteen inches in height is then placed around the stove about thirty-six inches from it. Inside this screen two water fountains are placed, and two hoppers filled with Purina Starting Mash. The chicks are then placed inside this screen, and, assuming that they are placed here in the early afternoon, at 6 P. M. they are given a feed of crumbly, moist Spratt's Game Meal containing twenty-five percent finely chopped hard-boiled egg. For the first three weeks this food is given four times per day. On the second day green food is given morning and afternoon, and is continued until the birds are moved to the holding pens. As a green food for the first week, lettuce is preferred. On the third day twenty percent dried skim milk is added to the dry mash. At the end of the third week, when the birds are removed to the intermediate house, the heat is decreased to 85 degrees at 15 inches from the base of the stove. At this period we change from Purina Starting Mash to Purina Growing Mash, but still add the twenty percent dried milk, and feed Spratt's Game Meal with ten percent egg three times per day. During the fifth week the heat is shut off, so that for at least three days the birds have no artificial heat. At the end of the sixth week they are moved to the open holding pens. At that time Chapin Lay-all Kernels are mixed with the dry mash. During the next two weeks Purina Growing Mash with the twenty percent milk is gradually eliminated. Spratt's Game Meal is now fed morning and evening with five percent egg. At ten weeks of age Spratt's Game Meal and egg is eliminated, so that the birds are getting Chapin Kernels exclusively. After several lots of birds had been in these holding pens and had stripped them of natural vegetation, we found it necessary to feed green food to the last lot of birds.

During July several of the five-weeks-old birds in one pen showed symptoms of coccidiosis, and a few of the three-day-old chicks were suffering from diarrhoea. It was also noticed at this time that some of the five-weeks-old birds were coughing with gapes. On noticing the symptoms of coccidiosis, specimens were immediately picked up from this pen (as well as all of the three-day old chicks with diarrhoea), and



sent to the Department of Veterinary Science, Massachusetts Agricultural College, at Amherst. They were autopsied by Dr. W. R. Hinshaw, who diagnosed one of the five-weeks-old birds as being heavily infected with coccidiosis. He recommended that these birds be fed forty percent dried skim milk in their food for four days, which was done by adding twenty percent more milk to the dry mash which was being fed to them at that time. Along with this the ration of Spratt's Game Meal and egg was continued. After being fed this forty percent milk mash for five days, the birds were transferred to the open yards and were then put back on their regular feed, and did not again show signs of the disease. As a means of prevention, when each lot of birds reached the age of five weeks they were given the forty percent milk mash for five days before transfer to the open yards. After the first lot of birds was delivered to the clubs from these yards and the next lot placed in them, there was reason occasionally to suspect that there might be a slight infection, so at seven weeks of age these birds were given forty percent milk for five days before feeding the Kernels. When gapes was discovered all birds over three weeks of age were fumigated with Black-erite once each week. The losses from these diseases during the season amounted to about twenty-five percent, and another twenty-five percent was caused by the six-weeks-old birds becoming chilled on being transferred to the open yards. The balance of the loss was among the baby chicks or accidental losses. Early in the season a salve or paste recommended as a remedy for vent, toe and feather picking, was procured and used freely with good results throughout the season.

Of the 7,200 chicks hatched, 2,536 were lost, 35 sent away for scientific examination, 6 sent to Forest Park, Springfield, for exhibition purposes, 4,513 distributed for wintering, and 110 are on hand November 30. (Of these 40 are to be added to the 1930 brood stock and 70 to be distributed to the clubs during December, for wintering).

Of the 409 adults on hand at the beginning of the breeding season 22 were lost, 56 distributed for liberation, 4 sent to Forest Park, Springfield, for exhibition purposes, and 327 remain on hand November 30.

### *Amherst Fish Hatchery*

During the early winter months brush cutting was done on the new tract, all fish cans repainted, screens and nets made.

The most important addition was a hatchery building, 20 x 32 feet, of one-story construction, with floors and sides up to three feet of concrete, and the superstructure of wood. Most of the materials were supplied from the lumber salvaged at North Dana. A concrete dam was built to impound the water from nearby springs and this water supply was piped into the hatchery. Hatching troughs were brought up from the East Sandwich Hatchery after having been thoroughly cleaned and painted; a stove was set up; and the electric light wiring extended from the superintendent's house across to the hatchery building.

The superintendent's cottage was improved by the installation of a cement floor in the cellar and a further strengthening of the supports under the floor. The front porch was glassed in and supplied with screens. All windows were screened and an oil stove was added to the house equipment.

A series of four additional rearing pools was constructed, as previously noted, through contributions of clubs. Owing to the fact that these were built in very soft ground it was necessary to make wooden sides. These are the first pools constructed at this hatchery not having natural dirt sides and bottom. In the pool system running along the lower side of the grounds a gravel bottom was put in.

In continuation of the reforestation program 3,360 trees were set out.

During the summer surveying was done on the Hubbard tract looking to its purchase with the funds contributed by the Massachusetts Fish and Game Association this year, mentioned under Acknowledgments.

*Brook Trout.*—The year opened with 59,000 fingerling brook trout on hand (a recount added 4,000 to the previous inventory). 5,000 were distributed to the local brooks and 54,000 were reclassified as yearlings. Of these 43,320 (six inches or over) were distributed to open waters and 2,180 (six inches or over) and 8,500 (under six inches) were distributed to club rearing pools.

For the work of the season 73,000 fry were received from the Montague Fish Hatchery. These did well and made a rapid growth until July 1. About that time an epidemic of fin and tail rot started, the first appearance of this disease at this station. Control measures were taken, and all fish treated with a solution of 1 to 2,000 copper sulphate, placing the fish in an ordinary washtub and keeping them there from one to two minutes. It seemed to be a very virulent form of the disease, and the trouble was not eradicated until the latter part of August. After that *Gyrodactylus* made its appearance, and all fish were successfully treated with a solution of 1 to 500 glacial acetic acid—40 quarts of water and 3 ounces of acetic acid. 1,000 fish from 3 to 6 inches may be treated in this quantity of solution, dipping 200 at a time and keeping them in the solution 1 to 2 minutes. An ordinary washtub serves the purpose. About the middle of September a gill trouble attacked all the brook trout. This bacteria is very dangerous and if not recognized in time will result in great mortality. The disease was overcome by using the same treatment as for fin and tail rot described above.

There were losses of 3,000 as fry, and 70,000 were reared to fingerlings. To these were added 28,300 fingerlings from the Montague Fish Hatchery. 19,300 fingerlings were lost, 18,000 distributed to local brooks, and 61,000 remain on hand to be carried through the winter for spring distribution. Owing to the various attacks of disease during the summer the fish received a severe set-back in growth, and consequently were not as large at the close of the year as was the stock of the year previous.

*Brown Trout.*—In previous years brown trout eggs from various sources had been hatched at the Palmer Fish Hatchery, and the fish, after feeding for a short period, brought to the Amherst Fish Hatchery for rearing. The hatching temperature of the water at Palmer being so much lower than that available at this station, together with the necessity of moving the fish at an early stage, produced unsatisfactory results. We believe that the construction of a hatchery building at this station, so that the brown trout work can be confined to it entirely, is a step toward correcting these conditions.

The year opened with 11,900 fingerlings on hand, which were reclassified as yearlings. 1,185 were lost, 115 distributed to open waters (first going to fairs—40 to the Eastern States Exposition, 25 to the Greenfield Fair and 50 to the Worcester Fair), and 10,600 are on hand November 30.

The 5,000 yearlings on hand at the beginning of the year were reclassified as adults and added to the 950 adults reported on hand at the end of the previous year. Of these 5,567 were distributed to public waters (6 going first to the Eastern States Exposition, 6 to the Worcester Fair and 5 to the Greenfield Fair), 16 distributed for display in the Northampton Courthouse fountain, and 367 remain on hand November 30.

For the work of the season 663,840 eggs were collected and sent to the Palmer Fish Hatchery for hatching. 107,000 fry from these eggs and 45,000 from eggs received from the U. S. Bureau of Fisheries station at Bozeman, Mont., hatched at Palmer, were received back for further rearing. 136,000 were lost, and the balance of 16,000 were reared to fingerlings. 6,000 of these were lost and 10,000 remain on hand November 30.

#### *East Sandwich Rearing Station*

There was no new construction at this station. The areas that have been turned over to the game farm were cleared of brush, and mowed off again in September.



No reforestation was done—there being but a small amount of land at this station except that actually used in fish culture.

*Brook Trout.*—The year opened with 58,020 fingerling brook trout on hand. 270 were lost and 57,750 reclassified as yearlings. Of these 12,435 were lost, escaped or unaccounted for, 32,615 (six inches or over) distributed to open waters, and 12,700 (under six inches) distributed to open waters.

For the work of the season 70,000 fry were received from the Sandwich Fish Hatchery, 16,200 of which were lost and 53,800 reared to fingerlings. To these were added 2,500 fingerlings from the Sandwich Fish Hatchery, making a total of 56,300. Of these 19,180 were lost and 37,120 remain on hand November 30.

The 3,260 yearlings (over six inches) reported placed in the large pond during the fiscal year 1928 liberated themselves in Scorton Creek.

*Chinook Salmon.*—For the work of the season 50,000 Chinook salmon eggs were received from the California Fish and Game Commission in exchange for an equal number of brook trout eggs sent them during the previous fiscal year. Of these 1,971 were lost and 48,029 hatched. 1,079 were lost, and 46,950 reared to fingerlings. Of the fingerlings 6,950 were lost, 10,000 sent to the rearing station of the Dighton Fish and Game Club, and 30,000 distributed to open waters.

*Blue Gills and Crappie.*—No report can be made on the 6,000 fingerling blue gills and 4,000 fingerling crappie which last year were planted in the large pond in an effort to establish a brood stock, as the pond has not been drawn down since.

### *Montague Fish Hatchery*

Additional progress was made toward the completion of the new house for the superintendent. The outside was given two coats of paint; a concrete walk built out to the proposed driveway; the grounds immediately around the house were regraded and coated with loam. The interior remains entirely unfinished and unequipped. Four drainage basins were installed to take care of the run-off from the spouting, and minor repairs to the roof and one end were necessitated by the house having been struck by lightning. The woodshed was lengthened by 10 feet.

The wooden holding boxes connected with the loading stand were repaired and placed on repaired and improved foundations.

The series of large rearing pools at the lower end of the grounds was so far completed with contributions acknowledged in another part of this report, that they were put into operation in the fall. This was made possible by running a pipe line from the main brook to a large cement water box built at the head of the pools. A new dirt and wooden dam was built across the depressed area between these new pools and the main brook, flowing a new area for rearing rainbow trout. The main brook below the last dam on it was straightened and walled up with stone to resist wash, and take care of the underground pipe line just laid in.

In continuation of the reforestation program 4,726 trees and a small amount of shrubbery were set out.

*Brook Trout.*—The year opened with 93,000 fingerling brook trout on hand. 3,500 were lost and 89,500 reclassified as yearlings. Of these 10 were lost, 73,590 (six inches or over) were distributed to public waters (5 being first used for display) and 7,950 (under six inches) and 7,950 (six inches or over) were distributed to club rearing pools.

For the work of the season 270,000 brook trout eggs were received from the Sandwich Fish Hatchery, and 150,000 were purchased. 90,000 were lost and 330,000 fry hatched. Of these 45,000 were lost, 73,000 transferred to the Amherst Fish Hatchery, and 212,000 reared to fingerlings. Of these 30,000 were lost, 28,300 transferred to the Amherst Fish Hatchery, 16,100 distributed to club rearing pools, 29,920 distributed to open waters (120 were first sent to the Eastern States Exposition) and 107,680



are on hand November 30 to be carried through the winter for spring distribution.

650 adults were on hand at the beginning of the year. 17 were lost, 78 distributed to public waters (first going to the Eastern States Exposition) and 555 are on hand November 30.

*Rainbow Trout.*—The year opened with 3,800 fingerling rainbow trout on hand, of which 1,605 were lost and 2,195 reclassified as yearlings.

The year opened with 1,800 yearlings on hand, to which were added the 2,195 reclassified fingerlings, making a total of 3,995 yearlings. Of these 1,960 were lost, 1,035 (505 under and 530 over 6 inches long) distributed to open waters (25 first going to the Greenfield Fair) and 1,000 are on hand November 30.

Of the 20 adults on hand at the beginning of the year 10 were distributed to fairs (6 to the Eastern States Exposition and 4 to the Greenfield Fair) leaving a total of 10 on hand, to which was added one salvaged from the Deerfield River by a local sportsman, making a total of 11 on hand November 30.

10,413 fingerlings were received from the U. S. Bureau of Fisheries as partial reimbursement for brook trout fingerlings sent their Nashua, N. H. station last year. (The balance due of rainbow fingerlings will be delivered during 1930.) Of these 1,713 were lost, and 8,700 are on hand November 30.

#### *Palmer Fish Hatchery*

A new roof was put on the superintendent's house and a pantry at the back remodelled into a small office. A china closet was built into the dining room and a kitchen cabinet into the kitchen. The kitchen was repapered and the bath room repainted. Where needed new eave troughs, drainage pipes and drainage boxes were installed.

At the Wright house the bulkhead steps, and also clapboards around part of the sills, were repaired. The kitchen and living room were papered, and where needed the porch screens were rewired.

At the Gray house the kitchen was papered and new cesspool installed for both tenements. A discarded hot water heating plant was taken from another station and installed in one of the tenements of this house.

In the early spring two pool overflows were replaced with concrete. A small oval pool was built to carry large trout for show purposes. On the main brook a new dam was put in to fit the large rearing pool. Some of the shade boards were replaced by driving two-inch pipe into the bank at a forty-five degree angle, with boards laid crosswise on them, resulting in a great improvement in the appearance of the pools. New flash-boards were placed in the large supply dam in front of the hatchery building. The main brook down to this point was straightened, and much of the overhanging brush and trees removed. During the fall bass ponds Nos. 4, 7 and 8 were resurfaced with loam to the depth of two or three inches and planted with aquatic seeds and plants.

A new Chevrolet truck was purchased to replace the old Reo.

In continuation of the reforestation program 1,500 trees were set out.

*Brook Trout.*—The 38,850 brook trout fingerlings on hand at the beginning of the year were reclassified as yearlings. To these were added 825 collected from the back brook on the hatchery grounds, making a total of 39,675. Of these 1,400 were lost, 30,475 (six inches or over) distributed to public waters, 800 (six inches or over) exchanged for pond fish obtained from a private pond in Prescott, and 3,500 (six inches or over) and 3,500 (under six inches) distributed to club rearing pools.

For the work of the season 80,000 brook trout eggs were received from the Sandwich Fish Hatchery. 2,275 were lost and 77,725 fry hatched. Of the fry 4,600 were lost, 250 distributed for study pur-

poses, 72,875 reared and reclassified as fingerlings. To these were added 9,042 fingerlings from the Sandwich Fish Hatchery, making a total of 81,917. Of these 27,800 were lost or unaccounted for, 10,200 distributed to club rearing pools, and 43,917 are on hand November 30.

*Brown Trout*.—From the U. S. Bureau of Fisheries 100,000 brown trout eggs were received in exchange for brook trout eggs, and 663,840 brown trout eggs were received from the Amherst Fish Hatchery for hatching. 215,724 were lost, 12 sent away for study purposes, and 548,104 hatched. Of these 365,784 were lost, 70 were distributed for study purposes, 30,250 were planted in open waters (250 being first used for study at the Museum of Comparative Zoology of Harvard University) and 152,000 fry transferred to the Amherst Fish Hatchery. (107,000 were fry from the eggs collected at the Amherst Fish Hatchery and 45,000 from the eggs of the U. S. Bureau of Fisheries).

*Small-mouth Black Bass*.—There were 424 black bass adults on hand at the opening of the year, to which were added 87 obtained from the various salvage jobs, making a total of 511. From the bass ponds there were collected and distributed 244,500 fry and 34,800 fingerlings (of which 100 were first sent to the Worcester Fair).

Of the 511 breeders 129 were lost, 14 distributed to public waters (9 first being displayed at the Eastern States Exposition and 5 at the Worcester Fair), and 368 are on hand November 30.

*Horned Pout*.—The 400 adult horned pout on hand at the beginning of the year are still on hand November 30.

From the supply pond 25,000 fingerling horned pout were collected and distributed to open waters.

The horned pout fingerlings and yearlings salvaged from the Connecticut River at Longmeadow, where it had overflowed its banks and left fish stranded in depressions on the shore, were held at the station for a time and then distributed.

*Large-mouth Black Bass, Pickerel, Yellow Perch, Blue Gills and Sunfish*.—The stock salvaged from the Connecticut River at Longmeadow were held at the station and later distributed.

### *Sandwich Fish Hatchery*

A new loading stand 14 x 18 ft. was built, with electric motor and pump attached to make it more convenient for loading the fish into the large salvage trucks for distribution. One new dam was rebuilt in the adult fish pond, to replace one which had rotted away. Three new artesian wells were driven for additional water supply. New eave troughs were put on the hatch house and a few minor repairs were made on the portable camp. The banks of the large fingerling ponds were resurfaced with gravel to make it more convenient for handling the fingerlings in sorting, as well as for keeping the ponds in shape.

*Brook Trout*.—The year opened with 103,900 brook trout fingerlings on hand, 900 of which were lost and 103,000 reared and reclassified as yearlings. Of these 11,435 were lost, 24 (six inches or over) used for experimental purposes, 70,445 (six inches or over) distributed to public waters (150 first going to the New England Sportsmen's Show, 10 to the Museum of Comparative Zoology of Harvard University, and 25 to the Massachusetts Institute of Technology for display and study purposes); 365 (under six inches) were distributed to public waters (300 being first displayed at the New England Sportsmen's Show, 15 at the Museum of Comparative Zoology and 50 at the Massachusetts Institute of Technology), 2,940 (six inches or over) and 13,500 (under six inches) sent to club rearing pools, and 4,291 remain on hand November 30.

Of the 6,450 yearlings on hand at the beginning of the year, 144 were lost, 500 (six inches or over) distributed to public waters, and 5,806 reared and reclassified as adults.



To the 3,013 adults on hand at the beginning of the year were added the 5,806 reclassified yearlings, making a total of 8,819 adults. Of these 1,243 were lost, 3,926 distributed to public waters (6 being first used for display at the Massachusetts Institute of Technology) and 3,650 remain on hand November 30.

For the work of the year 900,000 eggs were collected from station stock and 100,000 were purchased. 66,500 were lost; 270,000 sent to the Montague Fish Hatchery; 80,000 sent to the Palmer Fish Hatchery; 50,000 sent to the California Fish and Game Commission in exchange for Chinook salmon eggs to be furnished us in the next fiscal year; 10,000 were distributed to public waters (first having been used for display purposes at the New England Sportsmen's Show) and 523,500 hatched. Of these fry, 4,200 were distributed to public waters (4,000 first being displayed at the New England Sportsmen's Show, 100 being displayed at the Massachusetts Institute of Technology and 100 at the Museum of Comparative Zoology of Harvard University); 25,000 were exchanged with a private hatchery for 795 yearlings (6 inches or over) that were distributed to public waters; 70,000 were transferred to the East Sandwich Rearing Station; 76,800 sent to the Sutton Fish Hatchery; 101,500 were lost; and 246,000 were reared to fingerlings. Of these 58,000 were distributed to club rearing pools, 10,000 transferred to the Palmer Fish Hatchery, 10,000 to the Sutton Fish Hatchery, 2,500 to the East Sandwich Rearing Station, 63,100 were lost, and 102,400 remain on hand November 30.

### *Sutton Fish Hatchery*

A portion of the barn was remodeled to make a store room for a part of the gear of the salvage crews, and in the basement below this room a workshop was fitted up for boat-building and storage, and general repair work in connection with salvage and special work.

Some repairs and painting were done on the interior of the residence, and a portion of the lawn regraded.

A new fence was built on either side of the road entering the hatchery grounds, replacing that washed out by the flood of November, 1927.

The capacity for yearling fish was increased by deepening the silted-in area in the main rearing pond, and by an extension of the smaller pools to include a section of the supply brook.

Two thousand trees were planted in beds at the hatchery (for removal and replanting later) and about the same number taken up from beds already established, and replanted at the ponds.

*Brook Trout.*—The year opened with 40,000 brook trout fingerlings on hand, all of which were reared, and reclassified as yearlings. 5,975 were lost or unaccounted for, 28,725 (six inches or over) and 5,300 (under six inches) were distributed to public waters.

For the work of the season 76,800 fry were received from the Sandwich Fish Hatchery. 17,800 were lost and 59,000 reared, and reclassified as fingerlings. To these were added 10,000 received from the Sandwich Fish Hatchery, making a total of 69,000. Of these 23,050 were lost, 5,950 distributed to local brooks, and 40,000 remain on hand November 30.

### FIELD PROPAGATION

#### *Merrill Pond System*

Through many channels we have called attention to the difficulties of producing a volume of our common pond fish, pickerel, horned pout, perch, etc., which cannot be artificially propagated in hatcheries as is the case with trout. Nor can they be bred in small ponds on the principle applied to small-mouth bass. Our investigations so far indicate the only practical



method to be the establishment of series of ponds, running from ten acres upwards to a large size, in which brood stocks of these pond fish can be retained. Such ponds should be so constructed that they can be drawn down flat. The practice is to so draw them down each fall, collect the brood fish and hold them until the operation is over, run the small fish into large catching pens (some of these fish to be returned to the ponds for later distribution as two-year old stock), and return the brood stock to the ponds.

Our State possesses only one such system, which is known as the Merrill Pond System (so named in honor of Arthur Merrill, the superintendent of the Sutton Fish Hatchery, for whose vision and persistent energy and labor in bringing it into existence we are indebted). It lies in the town of Sutton, and is operated in connection with the Sutton Fish Hatchery.

The Merrill Pond System comprises a narrow strip of land, about two and a half miles wide, on which are located seven ponds, ranging in size from ten to twenty-five acres, and with a site for an eighth pond. We now have under water a total of one hundred acres of the possible 120 acres. In the system we own 92 acres and have 99 additional acres under lease with options of purchase at prices named in the leases.

The system was established in 1921, and each year we are developing it as rapidly as appropriations will permit.

Some of the ponds are the remains of old mill ponds, and the old dams (some of which go back to the eighteenth century) have been repaired and in some respects substantially rebuilt. They were originally built of large field stones taken from the nearby district. In all of our reconstruction and in the building of new dams we have continued the old style, with concrete facing on the upstream side, and heavy fill. Some of the original stone walls on the boundaries of the property are still in position. These will all be retained and repaired. Additional stone walls of the same type will be laid up where needed in order that the region will continue to retain its ancient appearance. In this way a remnant of old New England will be preserved for all time.

All of the areas above the flowage lands will be reforested, and it is hoped that additional areas will be acquired, to the end that eventually this entire system will be in a setting of magnificent evergreens. It will serve at once as a beauty spot and a joy to our people, while at the same time being a practical working unit which for generations to come should make a large contribution to preserving the gentle art of angling. For the purpose of description we refer to portions of the system under different units, as follows:—

#### *Stockwell Ponds Unit*

At the Putnam dam, on the fill that was made around the stone race-way last year, the stone wall was built on one side out to the emergency run-off. Stone has been brought on location to complete the laying up of all the wall around this point in preparation for future grading.

A new dam that has been in process of construction for several years at the Middle Pond has now been practically completed by additional fill on the crest of the dam. This dam, which is 257 feet long and about 10 feet high was built largely from contributions from local clubs, which is a fine commentary on the spirit of our anglers and hunters.

The Arnold dam was further strengthened by additional fill, and seepage that developed was stopped. The outlet on the down-stream side was further walled up, and additional fill was added toward bringing the roadway across the crest of the dam into a satisfactory condition. Shrubs and flowering plants were planted to improve the beauty of the location.

*Sutton-Thompson Unit*

On the Thompson dam the stone facing on the upstream side was continued from the point where this construction stopped last year. On the downstream side additional courses of stone were laid up and additional fill was made.

Excellent progress was made by the owner of the property (we hold it under lease) in the removal of all timber within the boundaries to which the pond will ultimately be flowed.

The town of Sutton dam was further repaired to entirely stop the seepage which was worked on last year. Also additional fill was put on the crest of the dam, and graded.

*Welsh-Sullivan Unit*

Construction of the dam was substantially advanced. This dam is of heavy stone construction around the flume, and the same general idea is being carried out on the wings of the dam as they are extended and raised as the work on the dam advances to completion. Part of the stone gutter or run-off between the base of the dam and the road was completed. Also a large amount of filling was made between the road and the dam. The dam is now so far completed that we can carry all of the head of water possible until the Eight Lots Road (which runs along one side of the pond) can be raised to a higher level. It is so low at points that if the water is raised any higher in the pond it will overflow. However, work is progressing as fast as funds are available to complete entirely the dam so that we can raise the water to the maximum height when the road has been finally filled in. On the downstream side of the dam and across the road from it, considerable excavation was made for the installation of a large system of catching basins.

In all the above pond units the channels were improved for running the fish down by removing such obstructions as logs, brush and mud banks, and fine sand was dumped in at the head of several ponds to drift along with the current and settle in the softer mud holes. Brush cut on the shore was thrown in to increase the amount of shelter. Stones were placed for horned pout nesting, and the construction of several types of concrete nests started. Additional tanks were provided for holding mixed fish as they are trapped, and improved methods worked out to sort and grade them.

*Breeding and Production*

We continue to report on the breeding, production and distribution at all the ponds collectively. When the system has been fully developed it may be possible to report on the results at each pond separately. However, this may not be done, for the reason that in our annual fall collection of the stock from the ponds we have found it practicable to draw down the water gradually, and float the fish downstream from one pond to the other to a concentration point where all the stock in the ponds can be handled most economically and expeditiously.

At the finish of the season of 1928 a large number of fingerling horned pout, blue gills and crappie were returned to the ponds for growth and to vary the distribution for 1929 with an increased number of yearling fish; also to reach a position for increasing the proportion of crappie over blue gills for breeding. This did not affect the capacity of the ponds for producing fingerlings, and the net result was a general increase in production.

The production of blue gill and crappie fingerlings was normal for the amount of breeding stock. Perch showed a marked increase, and the number was greater than was expected for the number of breeders put back. Horned pout bred well in all ponds, and for the whole made an abnormal increase over any previous number. Pickerel practically failed



to produce fingerlings, and the small number found were left in the ponds as far as possible. There seems to be no explanation for this, except that at times with some species there is a non-breeding year, or conditions that cause a failure of the eggs to hatch. This has occurred with other species, and did to a marked degree this year with shiners. In a thorough clean-out to eliminate the latter from the ponds, breeding fish far exceeding any other species were taken out, but only a few thousand fingerlings were found in the whole system.

The Sutton-Thompson Unit had been stocked only with horned pout, since these are the easiest removed under the present conditions (they have to be run down a rocky brook, with a descent of about 100 feet). The production was so notable that this plan was renewed for another season, and to do the work under the best conditions the ponds, after the removal of the horned pout stock, were sterilized to clear them of shiners and common sun-fish, the most persistent in remaining in a drained pond, and to have them so clean of all fish, except horned pout that they could be used for starting a new strain of any fish cultivated without mixture with the older stock.

The Stockwell Unit, now numbering four ponds, developed to full capacity, produced horned pout, blue gills and crappie mainly, with a large stock of yellow perch from the Schoolhouse and Putnam Mill Ponds. The growth varied in the several ponds, partly from the amount of stock contained, but more from the age of the ponds, and was far greater in the new pond built from club contributions, this resulting from the richness of a newly flowed pond in food. All of these ponds produced a substantial number of yearling fish without any apparent effect on the fingerling production.

The Welsh Unit was stocked largely with fingerling horned pout, crappie and blue gills in 1928 to produce yearlings on account of the uncertainty of building a suitable trap for fingerlings. The production and growth of these yearlings was very satisfactory, and in addition there was a record production of fingerling horned pout for in the ponds, from a comparatively small number of breeding horned pout put in to test the effect of possible fermentation of a newly flowed pond on horned pout fry, the only fish so far appearing to suffer injury in new flowage.

### *Restocking*

The only change in restocking the ponds has been the substitution of crappie for blue gills as far as the stock of these fish would permit. The number of breeding fish was somewhat reduced, as it is recognized that the removal of shiners gives larger production and growth of the fish bred for distribution. The plan of returning fingerlings for growth and yearling production was followed with an increased number.

The production or yield (meaning the whole number taken out in the complete drainage) was 900,000 of the fish cultivated. These 900,000 were disposed of partly by distribution, partly by returning to the ponds as brood stock (recorded in detail below), and some held for stocking club rearing ponds and distribution during the first part of the coming fiscal year.

The following stock from other sources was planted in the ponds: from Butler Ames Pond, Tewksbury, 270 adult horned pout, 1,210 adult crappie, 805 adult blue gills; from North Watuppa Pond, Fall River, 504 adult horned pout; from Suntaug Lake, Lynnfield and Peabody, 100 adult crappie and 50 adult horned pout.

### *Distribution*

Distributions from the ponds for the period of this report (December 1, 1928 to November 30, 1929) totalled 514,480 fish (of which 510,837 went to open waters and 3,643 allotted for other purposes) as follows:



Blue gills—184,300 fingerlings, of which 182,850 went to open waters, 700 to a club rearing pool, 750 to a pond on the Ayer Game Farm; 11,450 yearlings and adults, of which 11,385 went to open waters (38 first going to the Eastern States Exposition and 12 to the fair of the Worcester Agricultural Society), and 65 to the South Boston Aquarium.

Horned pout—121,870 fingerlings, of which 120,870 went to open waters and 1,000 to a club rearing pool; 27,167 yearlings and adults, of which 27,157 went to open waters (30 first going to the Eastern States Exposition and 12 to the fair of the Worcester Agricultural Society), and 10 to the South Boston Aquarium.

Yellow perch—38,400 fingerlings, all of which went to open waters; 6,285 yearlings and adults, all of which went to open waters (28 first going to the Eastern States Exposition and 12 to the fair of the Worcester Agricultural Society).

Crappie—118,650 fingerlings, of which 117,600 went to open waters, 300 to a club rearing pool, and 750 to a pond on the Ayer Game Farm; 1,700 yearlings and adults, of which 1,650 went to open waters (33 first going to the Eastern States Exposition and 12 to the fair of the Worcester Agricultural Society), and 50 to the South Boston Aquarium.

Pickarel—2,158 yearling and adult pickarel, of which 2,140 went to open waters and 18 to the South Boston Aquarium.

Common Sunfish—2,500 yearlings and adults, all of which went to open waters.

## FISH AND GAME DISTRIBUTION

### FISH DISTRIBUTION

Time has demonstrated the economy of distributing the output of the hatcheries and the rearing unit by our own trucks. While the type of truck in use is still inadequate as to carrying capacity and speed, yet great progress has been made in the last few years in the building up of this equipment. Great credit should be given to many local sportsmen's organizations for the assistance they have rendered us in going to the hatcheries with their own trucks and taking charge of the distributions from that point. While the most effective planting will be realized when all the fish can be transported in our own trucks and planted direct to the waters by our own fish messengers, the time when we will have sufficient funds to do this is remote. However, a start has been made by the promotion of two of our former wardens into the fish culturist class to serve, among other things, as fish messengers. There is great need of more men and more equipment in this field.

We continue in the belief that the planting of the fish in the spring as far in advance of the opening of the fishing season as possible, will give our fishermen the largest possible returns. The cost of the large rearing pools, feed and labor required to hold these fish from a given spring to the following fall, would be entirely beyond anything that could be financed with present or immediately prospective appropriations. When we point out that over 245,000 pounds of fish food (mostly hog livers and melts), were fed at our hatcheries during the past year, some idea can be formed of the additional costs. Any attempt at fall distribution would necessitate starting the work fairly early. Such a condition as obtained in our streams this fall because of the drouth period would have brought us face to face with insurmountable difficulties.

We take the opportunity to publicly thank 37 local clubs and chapters of the Izaak Walton League and individuals for the teamwork exhibited in constructing pools at their own expense, and supplying care and food to rear allotments of trout to a larger size. It is most advisable for all such persons to consult the Division before expending labor and money on the construction of such units. There are many important considerations

which can only be dealt with by an experienced fish culturist. The Division will be pleased at any time to supply expert advice on any locations or plans. During the past year the superintendents of our fish hatcheries, and particularly Superintendent Merrill of the Sutton Fish Hatchery, have travelled to locations and advised on these matters. Not only should this be done but we should have a sufficient force to enable us to provide an experienced fish culturist to visit each layout several times a year to inspect the fish and advise those in charge how to get the best results.

*Brook Trout.*—By the fall of 1928 each station had selected sufficient of its choicest 1928-hatched fingerlings to carry through the winter for liberation in the spring of 1929 as yearlings.

There were distributed (as by-products and for rearing) 143,170 fingerlings, 5,000 of which were 1928-hatched and 138,170 were 1929-hatched. It is not part of our plan of fish distribution to plant fingerling fish; but in concentrating on the production and distribution of legal-sized yearling fish only, enough fingerling fish must be carried through at the hatcheries from which to select a uniform stock for this annual yearly distribution, which necessitates culling out and discarding, during the process, a considerable number of fingerlings. This thinning out also makes for a better growth in the yearling fish.

There were distributed from all sources, either to public waters or to the local clubs for further rearing and later distribution, 352,245 yearling brook trout. (See table of distribution at the end of this section).

There were 4,004 adult trout distributed to open waters. Stocking of ponds with the large, stripped brook trout was continued in the following waters: Peters Pond, Sandwich; Onota Lake, Pittsfield; Job's Neck Pond, Edgartown; Lake Attitash, Amesbury; Congamond Lakes, Southwick; Norwich Lake, Huntington; Garfield Lake, Monterey; Pentucket Pond, Georgetown; and Lake Archer, Wrentham.

At the close of the year there are on hand at all the stations 392,117 (1929-hatched) fingerlings, 4,291 yearlings, and 4,205 adult brook trout.

*Brown Trout.*—During the year 30,250 fry, 115 yearling and 5,567 adult brown trout were distributed to open waters. At the close of the year there are on hand 10,000 (1929-hatched) fingerlings, 10,600 yearlings and 367 adults.

*Rainbow Trout.*—The only rainbow trout distributed during the year were 1,035 yearlings. There are on hand at the close of the year 8,700 fingerlings, 1,000 yearlings and 11 adults.

*Chinook Salmon.*—The only distribution of Chinook salmon was 30,000 (1929-hatched) fingerlings to open waters and 10,000 to the Dighton Fish and Game Club's rearing station. There are none on hand at the close of the year.

*Small-mouth Black Bass.*—The entire production of small-mouth black bass at the Palmer Hatchery (with the exception of a small number distributed to fairs), 244,500 fry, 34,800 fingerlings and 14 adults, was planted in the following specially selected waters: Seymour Pond, Brewster and Harwich; Great Herring Pond, Plymouth and Bourne; Wakeby Pond, Mashpee; South Pond, Savoy; Yokum Pond, Becket; Laurel Lake, Lee and Lenox; Clarksburg Reservoir, Clarksburg; Goose Pond, Tyringham and Lee; Noquochoke Pond, Dartmouth; Hazzard or Russell Pond, Russell; Metacomet Lake, Belchertown; Spy Pond, Arlington; Lake Mascuppie, Dracut and Tyngsboro; Sandy Pond, Ayer; Lake Boone, Hudson and Stow; Sudbury River, Framingham; Lake Waban, Wellesley; Lake Archer, Wrentham; Massapoag Pond, Sharon; Braintree Dam, Braintree; Clew Pond, Plymouth; Big Sandy Pond, Plymouth; Snow's Pond, Rochester; West Pond, Plymouth; White Island Pond, Plymouth; Jamaica Pond, Boston; Queen Lake, Phillipston; Silver Lake, Athol; Big Alum Pond, Sturbridge; Webster Lake, Webster; and Bare Hill Pond, Harvard.



The bass collected in miscellaneous salvage jobs were planted in ponds near the locations from which the fish were taken.

*Horned Pout, Blue Gills, Large-mouth Black Bass, Pickerel, Yellow Perch, White Perch, Crappie.*—An unusually large stock of native pond fish was distributed from the Merrill Pond System in addition to horned pout from the Palmer Hatchery, pickerel purchased from a private pond, and the fish collected in the various salvage operations. (For details, see Field Propagation and Work of the Salvage Units).

*Muskallonge.*—The New York Conservation Commission furnished 25,000 muskallonge fry which were planted in the Connecticut River at Montague.

*Alewife.*—No distribution of alewives was made during the year.

*Work of the Salvage Units.*—The salvage operations resulted in the collection of 194,347 fish (of which 190,879 were planted in public waters, and 3,468 allotted for other purposes).

From April 5 to May 3, Salvage Unit No. 1 operated on Martha's Vineyard collecting white perch from Tashmoo Pond, Tisbury. 50,200 adult white perch (4 to 7 in.) were collected and distributed to open waters.

From May 23 to June 2, Salvage Unit No. 1 operated at General Butler Ames Pond and collected the following fish, which were planted in open waters: 3,200 adult crappie (4 to 13 in.); 2,900 adult blue gills (3 to 6 in.); 375 adult horned pout (5 to 13 in.). In addition there were collected and sent to the South Boston Aquarium the following: 100 adult crappie (4 to 13 in.); 100 adult blue gills (3 to 6 in.); 60 adult horned pout (5 to 13 in.); 20 adult small-mouth black bass (9 to 13 in.); and to the Merrill Pond System to be used as brood stock: 1,210 adult crappie (4 to 13 in.); 805 adult blue gills (3 to 6 in.); 270 adult horned pout (5 to 13 in.). In addition, 25 adult crappie and 30 adult blue gills were sent to Holy Cross College for study purposes.

From May 27 to June 5, Salvage Unit No. 2 operated at Wenham Lake, Beverly and Wenham (water supply for Beverly and Salem) and collected the following fish which were planted in open waters: 3,267 adult white perch (6 to 12 in.); 384 adult yellow perch (6 to 10 in.); 193 adult small-mouth black bass (10 to 16 in.); 164 adult pickerel (10 to 20 in.); 5 adult horned pout (13 in.).

From June 9 to 16, Salvage Unit No. 2 operated at Artichoke Basin, Newburyport and West Newbury (water supply for Newburyport) and collected the following fish which were planted in local ponds: 1,795 adult white perch (4 to 14 in.); 355 adult yellow perch (4 to 10 in.); 365 adult horned pout (12 in.); 84 adult pickerel (14 to 27 in.); 3 adult small-mouth black bass (12 to 19 in.). In addition, 28 adult pickerel (14 to 27 in.) were collected and sent to the South Boston Aquarium.

From July 17 to 25, Salvage Unit No. 1 operated at Long Pond, Falmouth (water supply for the town of Falmouth) at the request of the town officials, who paid all expenses, and the following fish were collected and planted in ponds in Falmouth: 1,700 adult small-mouth black bass (9 to 18 in.); 1,600 adult yellow perch (9 to 14 in.).

From June 21 to 29, Salvage Unit No. 2 operated at Ludlow Reservoir, Ludlow and Belchertown (water supply for Ludlow) and collected the following fish which were distributed to local waters: 1,435 adult small-mouth black bass (9 to 15 in.); 95 adult horned pout (10 in.); 490 adult yellow perch (6 to 10 in.); 39 adult pickerel (10 to 16 in.); 121 yearling long-eared sunfish (4 to 5 in.).

From June 5 to 14, Salvage Unit No. 1 operated at North Watuppa Pond, Fall River (water supply for Fall River) and collected the following fish which were planted in open waters: 1,875 adult small-mouth black bass (8 to 21 in.); 3,581 adult white perch (9 to 15 in.); 1,325 adult yellow perch (8 to 14 in.); 1,650 adult horned pout (9 to 15 in.); 21 adult pickerel (16 to 24 in.); 32 adult pike perch (20 to 24 in.). In



addition, 504 adult horned pout (9 to 15 in.) were sent to the Merrill Pond System to be used as breeders; and the following were turned over to the Rhode Island Park Department for exhibition in a municipal aquarium in Providence; 10 adult small-mouth black bass (8 to 21 in.); 20 adult white perch (9 to 15 in.); 10 adult yellow perch (8 to 14 in.); 6 adult horned pout (9 to 15 in.); 3 adult pike perch (20 to 24 in.).

From September 19 to 21, Salvage Unit No. 2 operated at Tuxbury Pond, Amesbury and collected the following fish which were planted in open waters: 535 adult pickerel (7 to 25 in.); 920 adult yellow perch (4 to 12 in.); 5 adult horned pout (11 to 12 in.); 2 horned pout fry (1½ in.); 23 fingerling blue gill (2 in.).

From September 26 to October 3 Salvage Units No. 1 and No. 2 operated at Crystal Lake, Wakefield (water supply for Wakefield) and collected the following fish which were planted in Quannapowitt Lake: 775 adult small-mouth black bass (8 to 16 in.); 89 adult pickerel (14 to 24 in.); 455 adult horned pout (8 to 12 in.); 775 adult yellow perch (6 to 12 in.); 37 adult white perch (10 to 13 in.); 750 adult common sunfish (5 to 6 in.). In addition 8 adult small-mouth black bass (10 to 15 in.) were turned over to the Palmer Fish Hatchery for brood stock.

From October 5 to 11, Salvage Units No. 1 and No. 2 operated at Weymouth Great Pond, Weymouth (water supply for Weymouth) and collected the following fish, which were planted in open waters: 600 adult small-mouth black bass (9 to 18 in.); 1,000 adult horned pout (9 to 13 in.); 550 adult white perch (8 to 10 in.); 625 adult yellow perch (6 to 9 in.); 2 adult pickerel (18 to 24 in.).

From October 18 to 25, Salvage Units No. 1 and No. 2 operated at Suntaug Lake, Lynnfield and Peabody (water supply for Peabody) and collected the following fish, which were planted in open waters: 305 adult small-mouth black bass (12 to 18 in.); 430 adult crappie (12 to 14 in.); 245 adult horned pout (9 to 13 in.); 250 adult yellow perch (5 to 10 in.); 28 adult pickerel (18 to 24 in.). In addition there were sent to the Merrill Pond System 100 adult crappie (12 to 14 in.); 50 adult horned pout (9 to 13 in.); to Palmer Fish Hatchery, 36 adult small-mouth black bass (12 to 18 in.).

From October 30 to November 6, Salvage Units No. 1 and 2 operated at Great and Little Quitticas Ponds, Lakeville, Rochester and Freetown (water supplies for New Bedford) and collected the following fish which were distributed to open waters: 90 adult small-mouth black bass (10 to 18 in.); 5 adult large-mouth black bass (14 to 19 in.); 105 adult white perch (8 to 11 in.); 27 adult pickerel (17 to 27 in.); 115 adult yellow perch (6 to 10 in.); 75 adult horned pout (9 to 11 in.).

Several small jobs were accomplished, mostly by our wardens and superintendents, and the fish planted, unless otherwise stated, in local ponds:

From Cranberry Burrage Bogs, Halifax, 800 fingerling blue gills (2 to 4 in.); 550 fingerling pickerel (3 to 5 in.).

From Meadowbrook Flowage Basin, Amesbury, 25 adult yellow perch (5 to 9 in.); 25 adult white perch (5 to 9 in.).

From Crystal Lake, Gardner, 30 adult small-mouth black bass were collected and turned over to the U. S. Bureau of Fisheries station at Nashua, N. H.

From Herbert R. Wolcott's private pond in Amherst, 1,000 fingerling horned pout (2 to 3 in.); 980 yearling horned pout (3 to 6 in.); 20 adult horned pout (10 to 12 in.).

From the Connecticut River at Longmeadow (some were first sent to the Eastern States Exposition and the New England Fair at Worcester) 12,500 fingerling horned pout (2 to 3 in.); 6,325 yearling and adult horned pout (4 to 12 in.); 777 yearling and adult pickerel (5 to 17 in.); 230 yearling yellow perch (3 to 10 in.); 35 fingerling large-mouth black

bass (3 in.); 11 adult large-mouth black bass (9 to 14 in.); 135 yearling blue gills (3 to 6 in.); 50 yearling sunfish (3 to 6 in.).

From Noyes Pond, Westminster, 21,500 fingerling horned pout (3 in.); 8,600 yearling horned pout (4 to 5 in.); 8,600 adult horned pout (6 to 8 in.); 4,300 adult horned pout (8 to 10 in.); 3,750 fingerling pickerel (3 to 5 in.); 3,000 yearling pickerel (6 to 10 in.); 750 adult pickerel (12 to 15 in.); 560 fingerling yellow perch (3 to 4 in.); 2,240 yearling and adult yellow perch (4 to 5 in.); 1,680 adult yellow perch (6 to 8 in.); 560 adult yellow perch (8 to 10 in.); 560 adult yellow perch (10 to 12 in.); 400 adult shiners (2 to 6 in.).

From Howe Pond, Millbury, 6,000 yearling and adult horned pout (4 to 8 in.).

From Shippee Brook, Rowe, 9 yearling brook trout (4 to 6 in.).

From a small pool in Mansfield, 600 adult horned pout (6 in.).

From Crystal Lake, Gardner, 43 adult small-mouth black bass (8 to 14 in.) were collected and turned over to the Palmer Fish Hatchery for brood stock.

From Greens Pond, Fitchburg, 500 fingerling pickerel (3 to 5 in.); 500 yearling and adult pickerel (6 to 12 in.); 4,000 fingerling yellow perch (3 to 5 in.); 1,500 fingerling horned pout (2 to 3 in.); 2,000 yearling and adult horned pout (4 to 5 in.); 1,500 adult horned pout (6 to 8 in.).

From an unnamed mud hole in Athol, 387 fingerling horned pout (2 in.); 44 fingerling pickerel (6 in.); 33 fingerling common sunfish (3 in.).

From Woods Pond, Prescott, 600 adult pickerel (10 to 16 in.); 400 adult pickerel (8 to 10 in.); 1,750 adult horned pout (4 to 8 in.). An exchange of yearling brook trout will be worked out with the owner of this pond.

From Hales Brook, Chelmsford, 1,800 fingerling horned pout (3 in.); 375 yearling horned pout (4 to 5 in.); 225 adult horned pout (6 to 8 in.); 1,050 fingerling crappie (3 in.); 750 yearling crappie (3 to 6 in.); 50 fingerling blue gills (3 in.); 60 fingerling pickerel (5 in.); 100 yearling pickerel (5 to 10 in.); 125 fingerling yellow perch (3 in.); 65 fingerling small-mouth black bass (3 in.).

From the standpipe at Shaker Mill Pond, Hancock, 120 yearling (5 to 6 in.) and 30 yearling (6 to 7½ in.) brook trout.

From an unnamed pool in a dump in Springfield, 85 fingerling horned pout (1 to 2 in.); 40 yearling horned pout (5 in.).

From an unnamed stream on the Winchendon-Templeton line, 78 yearling trout (over 6 in.) and 48 yearling trout (3 to 6 in., average 4 in.).

A number of fish stranded in Westville Pond, Taunton, were driven by the superintendent of Salvage Unite No. 1 through the gates and down into Mount Hope Mill Pond, Taunton. They were mostly pickerel and large-mouth black bass. No figures could be arrived at on this particular job.

Under authorization from this Division the Fish Restoration Committee of the Fall River Rod and Gun Club salvaged, from North Watuppa Pond, Fall River, 876 adult small-mouth black bass (7 to 14 in.); 10 adult pickerel (12 to 22 in.); 85 adult white perch (5 to 10 in.); 20 adult yellow perch (5 to 11 in.); 9 roaches (5 in.).



	Product of State Hatcheries planted direct to public waters	Product of State Hatcheries reared by clubs to larger size be- fore liberation	Not hatchery product (pur- chase, gift, seining, etc.)
Brook Trout:			
Eggs and fry <sup>1</sup>	- 1		
Fingerlings <sup>2</sup>	- 2	84,300	
Yearlings (under 6 inches)	18,365	33,450	177
Yearlings (6 inches or over)	282,930	16,570	903
Adults	4,004		
Brown Trout:			
Fry	- 3		
Yearlings (6 inches or over)	115		
Adults (6 inches or over)	5,567		
Rainbow Trout:			
Yearlings (under 6 inches)	505		
Yearlings (6 inches or over)	530		
Chinook Salmon:			
Fingerlings	30,000	10,000	
Small-mouth Black Bass:			
Fry	244,500		
Fingerlings	34,800	-	65
Yearlings and adults	14	-	6,976
Horned Pout:			
Fry	-	-	2
Fingerlings	145,870	1,000	38,772
Yearlings and adults	27,157	-	45,585
White Perch:			
Yearlings and adults	-	-	59,560
Yellow Perch:			
Fingerlings	38,400	-	4,685
Yearlings and adults	6,285	-	12,134
Blue Gills:			
Fingerlings	182,850	700	873
Yearlings and adults	11,385	-	3,035
Sunfish (other than blue gills):			
Fingerlings	-	-	33
Yearlings and adults	2,500	-	921
Pickereel:			
Fingerlings	-	-	4,904
Yearlings and adults	2,140	-	7,136
Muskallonge:			
Fry	-	-	25,000
Crappie:			
Fingerlings	117,600	300	1,050
Yearlings and adults	1,650	-	4,380
Miscellaneous:			
Large-mouth black bass fingerlings	-	-	35
Large-mouth black bass adults	-	-	16
Shiner adults	-	-	400
Pike perch adults	-	-	32
	1,157,167	146,320	216,674

<sup>1</sup> The 10,000 eggs and 4,200 fry planted were some that had been first used for display purposes.

<sup>2</sup> The 58,870 fingerlings distributed were a by-product in the production of yearling stock.

<sup>3</sup> The 30,250 brown trout fry distributed were some which had first been used at the Museum of Comparative Zoology of Harvard University for display purposes.

### GAME DISTRIBUTION

*Pheasants.*—Our system of distributing pheasants is unique, differing from the practice in any other State. Each spring we liberate such adult pheasants as are carried over at the game farms in excess of the requirements for brood stock.

Up to this year practically the entire output of young pheasants from our game farms has been taken by clubs and individuals, carried through the winter in pens provided at their expense (they also paying for the labor and feed), and liberated the following spring as adult birds. This year, owing to the large increase in production, we could not find accommodations for several hundred birds, and adopted the following plan. All requests for young birds from the sportmen's organizations, local chapters of the Izaak Walton League and individual sportsmen, were filled. These birds were at least three months old, many running from 13 to 15 weeks of age when delivered. As the season progressed it was discovered that there would be a considerable surplus at the game farms, and late in



the distribution period we arranged with some of the parties which received the earliest birds, to liberate in the covers after the close of the shooting season on November 20, a portion of their birds (which would then be at least six months old and for all practical purposes fully developed). These were replaced, in most cases, with an equal number of our later-hatched birds (running from 3 to 4 months old) to be carried through the winter.

There are several reasons for following the present policy of liberating our birds as adults in the spring. One is to eliminate, as far as possible, the losses from putting immature birds into the covers prior to and during the shooting season. Another is to reduce the destruction of such birds by vermin—believing that the adult bird has a much better chance to survive vermin and rigorous weather than has the young. A most important factor, however, is the fact that large sections of this State are not ideal pheasant country. Only a relatively small portion of the State is farmed, and in practically no section is to be found extensive grain fields or a variety of cultivation which the pheasant prefers. If these birds were liberated in the fall as young stock we believe it is their nature to wander off seeking the more ideal living grounds, with a resulting concentration on some areas and a practical desertion of others. We believe that the distribution of adults in the spring immediately prior to the breeding season in the best covers available in a given region is more likely to result in the birds adjusting themselves to such localities, with a more even distribution of the resulting hatches. The hens will soon be heavy with eggs and will be forced to rest. The cocks will be held by the hens. The birds thus reared in a given area are less likely to wander away before the opening of the shooting season the following fall.

We have continued our policy of many years of shipping eggs for hatching to individuals and clubs willing to take them. While we could not give some applicants all of the eggs desired, there were none that went without any. We find, more and more, a desire on the part of such applicants to take larger numbers of eggs, in order to experiment with the use of incubators and brooder houses. Many are poultry breeders and familiar with the operation of such equipment. While the outcome has not always been satisfactory, in some cases surprising results have been noted. We furnish the applicants with instructions for the handling of these eggs in incubators, but it is not yet generally understood that the hatching and rearing of pheasants involves many considerations which are entirely different from those in the hatching and handling of poultry.

One of the great difficulties of handling pheasants under the incubator-brooder system is cannibalism. This year we demonstrated at the game farms that this trouble can be largely controlled, if not entirely eliminated, by using one of the commercial smears, as explained elsewhere. Prior to the time that the young birds were shipped the applicants were furnished, without cost, with a sufficient amount of one of these smears to enable them to deal with this condition.

It is desirable to reduce the handling of the young birds to a system as near "fool-proof" as possible. This year we demonstrated that the birds at the age shipped out, can be hopper-fed. In fact, most of them had been so fed for weeks prior to shipment. Steps have been taken to produce a satisfactory hopper to be sold at cost to applicants. We are certain these birds can be carried through the winter on a simple diet, providing considerable green food is supplied up to the winter months. We refer to a balanced ration made up as one food by the manufacturers of poultry foods. One such feed, kept before the birds in hoppers, will make the care of the birds increasingly less complicated and improve sanitary conditions. We take this opportunity to publicly acknowledge the splendid teamwork of the 134 individuals, clubs and chapters of the Izaak Walton League, which this fall took pheasants to rear to adult age and liberate without expense to the Division.

A very important link in this system is yet to be supplied. We refer to the need of one or more qualified bird culturists to travel through the State and inspect the suitability of all pens before birds are shipped. Despite the earnest efforts of the applicants we find that some do not yet understand the requirements. After the birds have been shipped the colonies should be inspected from time to time by our representative, who should also educate those in charge of the birds to the best methods of care and feeding. This applies also to groups which take substantial numbers of eggs for artificial incubation.

There were 13,261 eggs shipped for hatching, from which 5,009 birds hatched. Of these 1,715 were reared to the age of at least three months, and liberated. 484 are being carried through the winter for spring liberation—making a total of 2,199 birds produced in this branch of the work.

1,297 young pheasants (three months old or older) were liberated from the game farms in open covers during the fall. There were distributed to the clubs and others for wintering 11,470 young (including 10 purchased birds). A substantial number of these were distributed (as previously explained) after the gunning season, and these were replaced (in most cases with an equal number of later-hatched birds to be carried through until spring.

There were 1,499 adult pheasants liberated in the covers. These were 1928-hatched birds which had been carried through at the game farms, and discards from the brood stocks and the Ayer egg-stock (as well as the 134 pheasants wintered by the clubs).

At the close of the year there are on hand at the four game farms, for brood stock and spring liberation, 1,095 (1929-hatched) and 978 adult pheasants.

*White Hares.*—The Division imported and liberated 2,205 white hares. Special care was taken to place them only in localities providing suitable cover.

*Cottontail Rabbits.*—Penikese Island supplied 476 cottontail rabbits for restocking on the mainland—a substantial advance over last year's production.

*Quail.*—No distributions of quail were made except for the liberation of 27 excess adult cocks. The remaining 206 young and 81 adults were held for brood stock.

#### *Game Distributed to the Covers, 1929*

	Product of State Hatcheries lib- erated direct to the covers	Product of State Hatcheries wintered by clubs and others before liberation in the spring	Not hatchery product (pur- chase, gift, etc.)
<b>Pheasants:</b>			
Young (reared by clubs and others from the 13,261 eggs distributed for hatching)	1,715	484 <sup>2</sup>	—
Young	1,297	11,460 <sup>2</sup>	10 <sup>3 2</sup>
Adult	1,499	134 <sup>1</sup>	—
<b>Quail:</b>			
Adult	27	—	—
<b>Cottontail Rabbits:</b>			
Adult	476	—	—
<b>White Hares:</b>			
Adult	—	—	2,205
	5,014	12,078	2,215

<sup>1</sup> Carried through the winter of 1928-9.

<sup>2</sup> Carried through the winter of 1929-30.

<sup>3</sup> Distributed for wintering.

Considering the number of birds and the age, this is the largest distribution ever made by the State, and we believe it constitutes a record in the production of pheasants in this country.



## MARINE FISHERIES

## GENERAL

The fishing season of 1929 as conducted by Massachusetts vessels, large and small, has been one of the most successful in our history. It is also pleasing to note that the industry in general is rapidly improving on the progress indicated in recent reports and apparently faces a period of great growth. The production of haddock has increased to where more haddock are landed at Boston than at any other fishing port in the world. There were many outstanding features during the year, the most noticeable being the great demand for haddock fillets, both fresh and frozen. This in great measure accounts for the additional vessels now engaged in fishing upon the shore and off-shore grounds, a number having been built during the year and others having been changed over from dory fishing style to what are commonly known as draggers or small beam trawlers.

The landings of haddock have increased at the port of Boston more than 100% in five years. This remarkable record of the landings of haddock and the immense volume of fish business added by reason of the manufacture and distribution of fillets over an enlarging area prompts all to consider whether the source of supply of these fish can be made secure for years to come; in other words, that the great body of haddock which courses over the banks contiguous to the Massachusetts coast, and also those to the eastward in other North Atlantic waters, is not depleted in any serious measure. Facts on this point can only be obtained by scientific investigation. Unfortunately the Commonwealth of Massachusetts has no provision for any such work and also it should be noted that no state in the Union has as much at stake as has Massachusetts in this great haddock fishery. Therefore, it would seem to devolve upon the United States Bureau of Fisheries to conduct an intensive investigation of the haddock fishery together with the source of supply on the various banks and make reports and deductions from which, if it is found necessary, a plan of possible future action may be mapped out.

This is not said as an alarm that the haddock fishery is playing out, but in past years we have had, both on the Atlantic coast and the Pacific, specific instances where wonderful fisheries have declined simply as a result of over-fishing and where, taken in time and given a proper investigation and plan of propagation and protection they would have even now maintained a satisfactory volume. It is to guard against any possibility of the depletion of the haddock fishery that this suggestion is made, because around this fishery at the present time is wrapped millions of dollars invested in modern crafts and gear and fishing plants, and also the increasing demands of people hundreds of miles away from our shores for a continuation and increase of our service to them of haddock fillets.

As the result of this change in the method of fishing the so-called shacking fleet has practically disappeared, there being not more than one-half dozen vessels engaged in this branch of the fishery during the year; it being understood that this term "shacking" applies to vessels which formerly, from May to September, based their operations on the banks to the eastward of the 66th parallel of longitude and from there brought capacity trips which were entirely for splitting and salting.

Another feature of the fisheries year is the wonderful increase in the receipts of fresh mackerel and the welcome invasion along our shores of schools of these delectable fish in such quantities that one has to revert to the years of 1883 and 1884 to find its equal. The catch this year, as far as fresh mackerel are concerned, closely approximates the champion fresh mackerel year of 1926.

This increased demand for fresh, frozen and smoked fish in fillet form is shared by salted fish in packaged form, also whole smoked fish and pickled fish.



## STATE SUPERVISOR OF MARINE FISHERIES

During the year His Excellency the Governor and the Legislature approved the necessary legislation to set up a Marine Fisheries section in the Division—to be under the direction of a State Supervisor of Marine Fisheries.

The law creating the position (Chapter 372, Acts of 1929) transferred to the Supervisor most of the duties heretofore discharged by the Director but with the provision that the Supervisor should serve under the Director. This is the first time in the history of the Commonwealth that the State has committed itself to a policy of constructive service to this great industry.

Mr. Zenas A. Howes of Wellfleet was appointed by His Excellency the Governor to be the Supervisor, dating from October 16, 1929. Mr. Howes brings to the work a practical experience over many years in all branches—particularly shellfish.

The initial appropriation was sufficient to cover the Supervisor's salary, office assistance, the part-time services of Dr. David L. Belding as consultant biologist, necessary travelling expenses and office equipment. Quarters for the section were provided in the State House.

The Supervisor devoted himself to becoming familiar with those portions of the coastal area with which he had a previous limited contact, conferences with the boards of selectmen and representatives of the industry in general, and in the study of some local problems. It has been his aim to start the work by being as helpful as possible to the selectmen and others in an advisory capacity.

The coastal warden service is included in the marine fisheries section, and will serve under the Supervisor. Since the transfer of the coastal wardens' work occurred so near the close of the year, the report of entire year's work is included in the section on Law Enforcement.

## INSPECTION OF FISH

By reason of the large increase in the fish catch by Massachusetts crafts and also the greatly enlarged volume of business in all its branches, together with a very important and all-embracing decision of the Attorney General of the Commonwealth, an increase in the force of deputies is urgent. The inspections made during the past ten years have been of great value, not only to the fish dealers themselves and to the fish consuming public of Massachusetts, but also to those in other sections of the country who have the assurance that products of the sea landed at the various Massachusetts ports and manufactured and distributed by Massachusetts concerns, have been inspected.

It is desirable that this "new fish" idea shall be continued and enlarged upon. In order to keep up this high standard more and closer inspection is necessary. This can only be accomplished through additions to the inspection force. As is well known, the trade in fillets, both fresh, frozen and smoked has become almost the backbone of the fish business of the State, leaving aside for the moment the extensive dealings in salted and pickled fish. Many of the dealers at the present time owe their business success to the extension of this fillet trade and they are very anxious that nothing shall occur which will disturb or set back the natural trade increase which is to be expected; in other words, they wish to defeat any plans for placing in the southern and western markets fillets of inferior character.

At the present time, with but three deputies to cover the great wholesale fish pier at Boston and the fish wharves of Gloucester (ports which together are today receiving annually almost 350 millions of pounds of fresh fish) to say nothing of the outlying ports, it is simply impossible to cover adequately the whole field with the force at hand—especially when it is remembered that there are some 2,400 dealers throughout the whole

Commonwealth selling fish at retail and that each of these stores should be inspected two or three times a year. This suggestion of additional deputies is made in order that the State may be of increasing helpfulness to an industry which is developing the second largest natural resource in the Commonwealth and which is growing by leaps and bounds.

Another instance of the additional work which is being placed on our inspection force is the opinion of the Attorney General, who has decided among other things that the word "fish" as used in the statutes includes all forms of fish, such as fresh, frozen, cold storage, salted, pickled, or otherwise preserved, also all shellfish and crustacea. It can readily be seen that this widely expands the inspection requirements and is another evidence that additional deputies are necessary if the present high standard of the work is to be continued and maintained.

For the information of the general public, herewith is appended the decision of the Attorney General, and from its importance it is felt it should be in full.

"February 25, 1929.

Hon. William A. L. Bazeley,  
Commissioner of Conservation.

Dear Sir:

"1. You have asked my opinion as to whether or not, in advertising or other forms of publicity, cold storage fish must be so designated as to distinguish it from fresh fish.

"G. L., c. 94, Sec. 78, is as follows:

No person shall sell, offer or expose for sale fish which have been held in cold storage, without notice to purchasers that such fish have been so held, nor without the conspicuous display of a sign marked 'Cold Storage Fish'; nor shall any person represent or advertise or sell cold storage fish as fresh fish.

"G. L., c. 94, Sec. 74, as amended by St. 1922, c. 17, sec. 1, provides, in part, as follows:

All fresh food fish before being offered for sale or placed in cold storage shall be graded as follows:

No person shall represent, sell, offer for sale or advertise fresh or frozen fish of any grade under any but the truthful and correct name and grade or corresponding term for such fish.

The words 'advertising, or other forms of publicity,' as used in your question, may be somewhat ambiguous; and you may mean to include in these words some specific case in which it would be possible to construe the form of publicity as an offer, in which case, of course, notice that the fish offered has been held in cold storage is required by the statute. An advertisement, however, in the sense in which that word is commonly used, will usually be construed by the courts, not as an offer, but as an invitation for offers. See *Williston on Contracts*, section 27. And, in any event, it is clear that the word 'advertise,' as used in the two sections of the statute above quoted, is used as distinct from 'offer.' Assuming then, as I must, that your question refers only to advertisements or forms of publicity which are not in law offers, I answer your question in the negative.

"The requirement of section 78 as to advertisement is merely that cold storage fish shall not be represented as fresh fish. An advertisement of fish, without more, is not a representation that it is fresh, as distinguished from cold storage fish. Nor is there anything in section 74 which leads to a different



result. The words 'name' and 'grade' have no reference, as the preceding part of section 74 clearly shows, to any distinction between fresh and cold storage fish.

"2. You also ask my opinion as to whether or not the word 'fish,' as used in St. 1928, c. 40, sec. 1, includes all forms of fish, such as fresh, frozen, cold storage, salted, pickled, or otherwise preserved, all shellfish and crustacea. Said section, amending G. L., c 94, sec. 82, makes it criminal to sell for food purposes fish which is unwholesome or unfit for food. I think that shellfish and crustacea were intended to be, and well may be, included under the term 'fish' as used in this statute. Provisions relating to these types are contained in G. L., c. 130, entitled 'Fisheries.' See also *Weston v. Sampson*, 8 Cush. 347. Nor do I think that this statute makes any distinction as between fresh fish and fish that is salted, pickled or preserved. The purpose of the statute, namely, to guard against the sale of impure food, applies to all equally. Accordingly, I answer your second question in the affirmative.

Very truly yours,

JOSEPH E. WARNER, *Attorney General.*"

As to the general work of the office it can be said that more cases have been brought to court than the previous year and that the amount of fish seized and condemned was less than in 1928. The latter statement results from the fact that captains and crews have learned that poor quality trips are an economic loss to all concerned. Of the 48 cases brought to court but 5 were decided against the deputies. It is pleasing to note that as a general proposition the policy of inspection has the concerted backing of the wholesale fish men all along the coast.

On February 13 Lawrence N. MacKenzie of Provincetown was appointed to fill the vacancy made by the death on November 6, 1928 of Captain Jerry E. Cook of Gloucester. Mr. MacKenzie has been connected with the fisheries as hand on fishing vessels and as manager of fishing plants practically all his life.

The following table shows in brief some of the work of this office for the year 1929:

Inspections in retail stores, 3,578.

Inspections in wholesale stores, 21,414.

Freezer inspections, 347.

Inspection of pedlar's carts, 100 weekly.

Inspections at Yarmouth, N. S. steamer, 147.

Vessel inspections at Gloucester, 877.

General inspection trips, 5.

Fish condemned at Boston Fish Pier from vessels, 1,200 pounds.

Fish condemned at Gloucester direct from vessels, 25,000 pounds.

Fish condemned at retail stores, 2,006 pounds.

Condemned at Boston Fish Pier from consignments on Yarmouth, N. S. steamer; graded as "jellied" 42 fish; 10,491 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 2,837 pounds; 400 pounds of lobsters.

Condemned, landed at Boston Fish Pier arrived by rail, 20,246 pounds fish; 608 pounds oysters; 139 pounds scallops.

Condemned, landed at Boston Fish Pier, direct, graded as "jellied" 88 fish; 23,390 pounds.

Total condemned at Boston Fish Pier, and at Boston from Canada by rail and steamer, 59,311 pounds.

Total inspections, 31,563.

Total fish condemned, 86,317 pounds.

Total court cases, 48.

Total convictions, 43.



## THE DEEP SEA FISHERIES

The building of new crafts of the latest design calculated by modern methods to catch the most fish in the least possible time and bring them to market practically "right alive," is bringing more and more into the limelight and extending country-wide the supplying of Massachusetts fish to practically every corner of this country. We are not in a position to give exactly the amount of the total landings of fish at our various ports, but it is our opinion, conservatively expressed, that were figures at hand to add to the data published by the United States Bureau of Fisheries the total would be so compellingly large as to leave no doubt in the mind of a business man that Massachusetts now, as always, is, without question, the largest food fish producing state in this country.

Space permits only a resumé of the doings of the different fleets and for this reason figures are relegated to the rear and contained in the various tables under Boston, Gloucester, etc. The year's showing indicates a remarkable increase in the catch of groundfish, particularly haddock; an increase in the catch of fresh mackerel to the extent that the total will closely approach the record fresh mackerel year of 1926, and so on. The only noticeable falling off is in the catch of halibut and this can be accounted for partly by the decrease in the number of vessels pursuing this particular line of fishery. For instance, this year but 17 vessels pursued the halibut fishery where but a few years ago the number was 30. The halibut catch will total 2,717,607 pounds and it is interesting to note in this case that one vessel of this fleet landed 552,000 pounds of the entire catch and that this vessel fished on the banks to the eastward, that is Green Bank, Grand Bank, St. Peters Bank and Quero. Continuing the halibut story a little further it is to be noted that the total catch was pretty evenly divided between the eastern and the western banks; that is, after the advent of fresh bait the vessels fishing on Georges and Browns made quick trips and small catches but in the end they counted up to such an extent that the fish landed from eastern and western banks about made a 50-50 percentage. As the halibut fleet practically knocks off fishing the latter part of October and does not resume until the middle of January and possibly the first of February it cannot be said that a closed season would be the panacea for the ills which beset this fishery. Rather it is fair to assume, and this on the opinion of hardened halibut fishermen, that the more vessels that go the easier it is to keep run of the fish and consequently the larger the catches. At present with but 17 vessels it is not at all easy to keep run of the migrations of these fish on the various banks.

As to the haddock fleet which today is the backbone of the fishing industry, the year beginning December 1 opened with a good supply, but fell off with bad weather on the fishing grounds, only to meet with good success again just before Christmas and met with the lower prices that usually apply when the supply is large. From Christmas on to the middle of January, the fleet operated with success, obtaining moderate fares and meeting with high prices, following which time bad weather set in and light receipts were in order. It is worthy of note here that in 1927, along about January 25, so many fish were landed for the week that the market was unable to take care of them and many trips went to the splitters to salt. Early in February heavy weather and snow storms were conducive to light catches and this was the order of the day. One craft was so fortunate as to secure a good catch on which the stock of \$9,480 was made on which the crew shared \$300, the vessel having been out only a week.

Approaching the opening of the Lenten season, on February 15 the total receipts for the year was still over a million pounds behind that of the previous year, but moderating weather set in and good catches were made and prices were lower. Good fishing weather prevailed for quite an extended time and the fleet profited accordingly. For the week ending February 20 at the Boston Fish Pier there were 142 arrivals landing 7,222,050 pounds of fresh groundfish which at the fish pier was considered the

record for all time, the previous heavy record having been for the week ending March 17, 1927 when 129 arrivals landed 7,084,100 pounds. These figures however were put in the shade when for the week ending March 28, 139 arrivals landed 7,843,550 pounds, which is without doubt the record for all time of the fishing fleet landing at the Boston Fish Pier.

On March 4 there were 51 arrivals at the Boston Fish Pier landing 2,365,900 pounds of groundfish, the largest day of the season and one of the largest on record, this being accounted for by good catches of haddock and cod on Georges. Naturally, as one would expect, the prices were the lowest that day of the year, but bad weather came and a sharp advance was noted in the following few days. On March 15 one craft happening to have good success on Georges landed a trip on March 12 of 100,000 pounds of cod and haddock in which the stock of \$7,700 was made, the crew sharing \$304 to a man and the craft having been gone but six days. For the week ending March 28, as previously noted, there were landed at the Boston Fish Pier 7,843,550 pounds of fresh groundfish and on March 27 of that week 20 arrivals landed a total of 1,600,000 pounds of groundfish of which 1,300,000 were haddock and this caused Fred F. Dimick of the Boston Fish Bureau, an acknowledged expert, to remark that more haddock were landed at Boston direct from the fishing fleet than any other port in the world, not excepting Grimsby, England. From this time on the haddock fleet enjoyed its usual prosperity, the demand for haddock for filleting being so large as to insure good prices throughout the spring and summer months. The fall season opened with bad weather and short catches, the crafts finding fish scarce in South Channel and on Georges and the captains seemed to be of the opinion that this condition of affairs was liable to continue throughout the coming winter or until the school fish struck.

The record of the swordfish fleet for the year was the largest in regard to the number of fish taken and price received of any year since crafts have gone for these now most popular eating fish. The first trip of the season, 12 fish were landed at Woods Hole and received a price of 45 cents per pound, following which the landings at Boston and other ports was one succession of prosperity catches. The vessels made their trips in short time, the fish did not average over-large in size and as result it was necessary to condemn but very few fish as jellied.

The popularity of swordfish can be seen when it is stated that despite the unusually large local catch, for the receipt of eight cars of swordfish from the Pacific coast by Boston Fish Pier dealers found no trouble in finding a lucrative market at practically the same prices as were paid for the home goods. During the winter season also several cargoes of frozen swordfish were brought to the Boston market from the Pacific coast and were eagerly absorbed by the trade. These fish came from San Pedro and San Diego, California.

The Newfoundland herring fleet experienced a good season, the first cargo of 1,500 barrels of salt herring from Bay of Islands being received at Gloucester on December 13, 1928. From this on, bulk cargoes of salt herring and many barrels of pickled herring were received, but as far as noted no cargoes of frozen herring were brought to market from Newfoundland ports.

The total landings of the Newfoundland herring fleet at Boston and Gloucester for the year aggregated 17,880 barrels of salt bulk, 730 barrels of pickled, and 50 barrels of Scotch cured, although this does not show the total amount of these fish handled by these two ports because many thousands of barrels arrived via steamer and were eagerly absorbed.

The fleet was somewhat larger than the previous year and the fares landed met with good demand for smoking and as pickled barreled goods, the Scotch method of preparing evidently being responsible for a good demand for this line.



The gill netting fleet from Gloucester had a prosperous year and it is interesting to note that this fleet is increasing in size yearly, for after having dropped to a mere six or seven vessels, at the present time at least from twenty to twenty-five crafts are engaged in this line of shore fishery and doing well in catching cod, haddock and pollock in season. Of course these crafts are able to turn over almost immediately into mackerel fishing when the season shows the chance for a profit in that direction.

All in all it is safe to say that never in the history of all time has the fleet of fishing crafts hailing from Massachusetts enjoyed such an era of prosperity as was theirs in the year 1929.

### *The Mackerel Fishery*

But for the fact that unusually bad weather faced the mackerel catching crafts both in last spring and this fall, it is perfectly safe to say that the 1929 season would have broken all records since the fleet as a whole has confined its operations to landing its catches fresh. It is felt that it is not fair to compare the catches of recent years with those of 1883 and 1884 when the fleet, numbering some 500 or 600 sail of vessels, landed between 400,000 and 450,000 barrels of salted mackerel, because of the fact that the fleet in recent years is practically around 100 crafts only and that outside of the spring operations in southern waters and a few crafts going to the Nova Scotia Cape shore for a two weeks' trip in the spring, operations are now practically confined entirely to waters contiguous to the Massachusetts coast, and when a comparison is made between the two it is believed it can be shown that in proportion to crafts and men engaged at the present time the "good old days" are left far astern.

The mackerel fleet in its annual southern venture began to fit away in the latter part of March and the first craft to head south was the schooner *Linta*, Captain Joseph Fronterio which sailed from Gloucester on Tuesday, March 26, the date of sailing of course as usual being based upon the approach of the dark nights. This craft was quickly followed by many others of the fleet to the extent that by April 5, forty crafts had made their getaway.

The first catch of mackerel in the southern waters this spring was made by the steamer *Lois H. Corkum*, Capt. William Corkum, which arrived at Cape May on April 8, having 2,000 pounds of mackerel which weighed about two pounds each and were taken in latitude 38 in forty fathoms of water, the captain reporting seeing only a few small schools of fish. However, between this date and the closing of the week the numerous crafts of the fleet found quite a body of fish with the result that there were 27 arrivals at Cape May and one at New York landing a total of 364,000 pounds of fresh mackerel, the fish running from 1¾ to 2 pounds each in weight, while there were mixed in fish weighing a pound and also some weighing 2½ pounds each. The first landing in 1928 was that by the schooner *Stiletto*, Capt. Howard Toby, at Cape May with 3,000 pounds of fresh mackerel, weighing 1¼ to 2½ pounds in weight, caught 25 miles southeast of Winter Quarter Lightship.

From then on for quite a spell the fleet met with easterly winds and bad weather and this, with the combination of light nights, was not favorable to the mackerel fishery. These conditions continued until May and a size-up of conditions can be had by the fact that up to April 26 the fleet had landed 3,387 barrels as against 12,831 barrels for the same date the previous year. With the advent of May, fishing conditions improved and some good fares, mostly by the netters, were landed at New York, Atlantic City, Cape May and also at Boston. By May 17, many of the fleet of seiners had arrived home at Gloucester reporting a poor season and blaming their ill success to the continued



bad weather and the fact that the fish were in small schools and very wild.

Some of the crafts fitted immediately for the Nova Scotia Cape Shore, while others elected to return to southern waters believing that with the advent of good weather there was a fine opportunity for good catches as they had seen what they considered to be a very large body of fish working to the northward.

The judgment of those who went back south was confirmed quite soon by some very fine catches, but still by the first of June we were confronted by the fact that the catch in southern waters amounted to but 29,991 barrels as compared with 46,067 barrels the previous year. The fish however, were coming along and large schools were sighted fifty miles from Nantucket Lightship and to the southwest of Block Island and soon some fine fishing was enjoyed. The same story applied however, to the crafts that went to the Cape Shore but this latter was only a small portion of the fleet. However, their success chimed in with that of the crafts which fished off Long Island, Block Island and No Man's Land.

Along about the middle of June the fleet began as a whole to enjoy real prosperity and from then on to the end of the season and the beginning of the bad weather in the late fall, or, rather, the early fall, it was simply a succession of splendid catches with prices graded only by the number of trips which happened to be at market on any particular day. It is doubtful if ever in the history of the mackerel fishery were as many mackerel taken on the shore grounds contiguous to Massachusetts as there were taken this year. At times the glut of the market was so great that millions of pounds had to be landed to be split and salted, there simply being no other way to take care of these. Thus at the Boston Fish Pier and also at Gloucester days were quite common when a million pounds would be awaiting the bids of the dealers. These fish were what the dealers generally figured as "pound fish" but which really run from  $\frac{3}{4}$  to  $1\frac{1}{2}$  in weight. As the season advanced, the fish, naturally thriving on splendid feed on the shore grounds, increased in fatness so that the quality was of the best. The range of the schools was wide; for instance, when fish were being taken off South Shoal Lightship and No Man's Land at the same time fish would be taken off the Isles of Shoals and in South Channel, and this situation applied practically throughout the whole season. By the latter part of June it would seem that the large body of the fish had definitely been located in South Channel, from 50 to 60 miles southeast of Highland Light, Cape Cod. The great majority of these fish at this time weighed from one to two pounds each, and at the same time the fleet reported seeing many schools of tinker mackerel going from  $\frac{1}{2}$  pound to a pound and blinks that would go three or four to a pound and some that would go six or more to a pound.

The catches during June had been mounting rapidly and the first week in July saw a catch of over 23,000 barrels, these being mostly of two-pound fish, with smaller ones being noted by their absence. So great was the strain this week on the retail market that more than a million pounds were landed at Gloucester to be disposed of for canning and salting and also for freezing. At this time also the traps on the lower end of Cape Cod were making large catches of blink mackerel.

The success of the fleet, as stated above, continued throughout the summer season, the body of fish still being centered around South Channel and Georges Bank, with smaller catches being made of mixed sizes inshore, and blinks and tinkers again being reported in large quantities. Toward the end of July the major portion of the catches, instead of being of two-pound fish, were tinkers and blinks, these being taken mostly off Chatham while the schools of large fish on Georges and South Channel were noticeable by their absence. From then on the operations of the fleet ranged from South Channel to the coast of Maine and the fish running in about four sizes—two-pound fish, one and one-half and one pound

and one-half pound, but mostly the half pound to pound fish. Reams could be written around the operations of this mackerel fleet during the season but space forbids. By August 17, despite the bad start out south the landings of the fleet had actually exceeded those of the previous year of the same date by some 2,000 barrels and this supremacy was held and increased even until it almost seemed possible that the record year of 1926 would be exceeded, but the bad weather of the early fall put a damper on these hopes, and the year ended with a catch but three million pounds short of the 1926 total, which certainly is cause for congratulation to all engaged in the mackerel venture. During the early fall, many large individual catches were made and many large day's receipts were recorded. The weather, however, from the time the fall netters started was very bad indeed, with the result that this large, fine fleet of small crafts which hoped to do as well as the previous year was doomed to disappointment.

The Massachusetts catches of fresh and salted mackerel from December 1, 1928 to November 30, 1929, inclusive, and for the corresponding period of the three previous years, were as follows:

	Dec. 1, 1928 to Nov. 30, 1929	Dec. 1, 1927 to Nov. 30, 1928	Dec. 1, 1926 to Nov. 30, 1927	Dec. 1, 1925 to Nov. 30, 1926
Salt Mackerel (Bbls.)	1,464	352	1,002	5,380
Fresh Mackerel (Bbls.)	286,582	199,565	252,962	304,385
	<u>288,046</u>	<u>199,917</u>	<u>253,964</u>	<u>309,765</u>

*Cape Shore Catches of Mackerel for Eight Years*

Year	Arrivals	Fresh Mackerel (Pounds)	Salt Mackerel (Barrels)
1929 . . . . .	13	833,000	60
1928 . . . . .	8	385,000	19
1927 . . . . .	3	155,000	3
1926 . . . . .	53	2,397,700	1,310
1925 . . . . .	34	1,545,000	1,075
1924 . . . . .	24	996,000	854
1923 . . . . .	31	1,240,680	211
1922 . . . . .	48	1,353,900	2,344

*Improvement in Bluefish and Striped Bass Catch*

It would seem that the prediction made in this report last year that indications were good as to the gradual comeback of the bluefish and striped bass along our shores through Vineyard and Nantucket Sounds and Buzzards Bay, and also the inner side of Cape Cod (this being based upon, of course, reports from all of these vicinities), is coming true, inasmuch as in some of these localities a marked increase in the catch of these fish has been noted and also, in the case of the bluefish, a marked increase in the size of the fish taken. This increase has been gradual and was first definitely noted in 1927 and so judged from a three-years standpoint, a feeling that it will continue can be taken as being based upon actual results. From all the reports received at this office and also from personal contact with many people along the coast come reports of the most encouraging nature, especially as to bluefish. For instance, to start in with, even up along the coast on the northeast corner of the State, where bluefish has never attained any prominence, our deputy writes us, "Bluefish weighing from 1 to 2 pounds each were taken in some numbers in Parker River and Plum Island Sound this summer."

During the late summer the newspapers of Martha's Vineyard and Nantucket used columns of space describing the remarkable bluefish-



ing enjoyed by those who love the sport and hailed the return of these fish in the waters of the Vineyard and Nantucket Sounds in such goodly quantities as to induce them to recall the days of 1914 and that vicinity when great catches were made by hook and line and the heave and haul methods. At Nantucket for instance, it was cited that on Sunday, July 11, sixty-three men and boys were lined up on the beach all fishing at one time for bluefish and that one man landed 73 fine specimens, which surely must have approached the catches of the "good old days." It will be remembered here that the bluefish deserted Nantucket waters after 1914, disappearing suddenly, just as they had on several occasions in the dim, distant past and that many people predicted they would never return. But here they are in 1929 with splendid catches being made. The fishing for bluefish continued through August and the consensus of Nantucket opinion was that the fish were there to stay and would return next year. Even as late as the last week in August, Nantucket handliners and summer visitors were enjoying the finest kind of bluefishing.

At Martha's Vineyard the story of the return of the bluefish seems to be the same, not that the numbers were overwhelmingly great, yet these gamey fish were in Vineyard waters sufficient to provide good sport for the sporting fishermen and also a considerable financial gain to the commercial fisherman. Both the Vineyard and Nantucket papers contributed columns of reminiscences of the old days when bluefish were plentiful and how the present day fishermen should rig their fishing gear in order to obtain the best results. Accurate advices show that there was a marked increase in the number of bluefish caught in both Vineyard and Nantucket Sounds in the traps as well and that they ran to better size than the previous year and also that a good run of striped bass proved profitable to the commercial fishermen as well as furnishing plenty of sport for the rod and reel men.

Turning to the Cape proper, more bluefish were taken in Pleasant Bay this year than for many years back and the fishermen there are of the opinion that this indicates a return of these fish. It can be said here, however, that while striped bass were more plentiful in these waters, not as many fish were taken as last year because the weather when these fish struck in was not favorable to good fishing.

At Brewster, Warren E. Burgess, who for the past two years has furnished this office with very interesting news in regard to the bluefish, says that his traps there took 5,000 pounds of bluefish during the season weighing from 1 to 5 pounds each, but mostly two-pound fish, the fish striking in about July 1 and continuing until October 25. He also took about 500 pounds of striped bass during the same season and the size ran from 2 to 14 pounds. Mr. Burgess notes that there were more bluefish and bass along the Cape Cod coast in this vicinity than during any recent previous year, and although his catch was not as high as 1927, it was because of the fact that the bay was full of sharks all the season and it seems that at times when the blues and the bass were running, the sharks ran also and that the sharks made war on these fish with unpleasant results. He also notes, after stating that he caught and shipped many sharks to market, that a great many of them tore the traps, sometimes making as many as a dozen holes as big around as a barrel and of course the bass and bluefish easily found these holes and simply left the trap leaving no trace.

At Wellfleet during August there were taken at least four schools of striped bass aggregating 6,500 pounds in weight. These were caught in drag seines and the largest single catch was 3,300 pounds and netted the fortunate crews a little over \$1,000. The next largest school was 1,600 pounds in weight. These four schools were caught by the same men and they happened to be the only ones on the Cape that were fitted and rigged to catch these kind of fish with seines.



The Provincetown traps made a few small catches of striped bass also. They got their hauls in September. The traps at two concerns landed 750 pounds each on one day and the next day two other traps had 400 pounds each; then there were others that had from one to five fish in count at different times. In all, about 4,000 pounds of striped bass were taken by traps at Provincetown harbor.

It will be of interest to record this quotation headed "Bluefish" from the Vineyard Gazette of Edgartown, Martha's Vineyard which said—

"Bluefish are more plentiful in these and neighboring waters than they have been since the good old days when the favorite outdoor sport of Vineyard boys was to see which one could heave a jig the farthest, and nothing counted under 60 fathoms.

"These blues don't run to any great size, the largest average around six to six and one-half pounds per. Their favorite schooling ground seems to be around Marion where the boats have been drailing 25 or so a day, but there are some fish nearer home and the bay traps are bringing in a few at every haul. The striped bass are still in our midst, and down along the Cape Shore they are getting more than they are here, but none of the old timers will do much raving about them as long as there is a chance to get a blue on a drail."

These intimate figures and remarks are made here because of the realization of what the probable return of the bluefish and striped bass means to thousands of people, sportsmen and commercial fishermen alike, in the waters of this state from Nantucket to Cape Cod. While the destructive qualities of the bluefish to other fish are well known, yet it is hardly possible to find a fisherman who does not earnestly wish for the return of these wonderful fish in goodly numbers.

### *Cape Cod Activities*

It seems to be the general opinion that fishing from Cape Cod ports was not as good as in 1928. It is true that there are some high lights which give encouragement for the future in the recurrence of the bluefish and striped bass, but at the same time it is necessary to note that it was not what the dealers would call a good trapping year, and, after all, the success of a Cape Cod fishing year depends considerably on what measure of success attends the traps. Some species of fish were found in more abundant quantities than last year, while, on the other hand, some which are considered staples were not caught in as goodly quantities as the previous year. For a comparison it might be shown where ten men fishing a string of ten traps in 1928, one crew of five shared \$1,000 and the other crew of five shared \$1500. The same crew with the same traps this year shared, one crew \$1,000 and the other \$800. After August 15 very few fish were taken in the traps. Weather conditions, however, during the season were good for trapping, which means there was very small loss of twine from storms. However, the fishing was not as good as last year.

The trap season on Cape Cod opened early. Some of the traps in Provincetown harbor were kept in the water all winter. They caught herring and spurling at different times, but in no great quantities. The price received, however, for these catches was large and so the trap owners were well paid for their judgment. The other trapmen who hauled their traps before Christmas started driving early in February and as soon as the traps were fishing began to get spurling. These were shipped to New York and sold for food fish. These small herring at times were very plentiful, so plentiful, in fact, that it did not pay to ship them "to arrive" on only the first three days of the week. About 40% more spurling were caught this year than were taken in 1928.

Large herring generally strike around Provincetown every spring about the middle of May. This year they struck in about two weeks later than

usual, and not in such plentiful quantities as usual, and they did not stay as long. These herring are the fish that the freezers depend upon for bait herring to last them through the winter, but there will be no winter service in this respect as the catch was only about 30% of normal and the freezers were sold out on them by July 1.

The whiting catch also showed a decrease over the last year, and, indeed, was far below the average of the past five years. It is estimated that 30% less whiting were caught this year than in 1928 by the traps. The consensus of opinion is that the freezers at Provincetown, North Truro and Chatham are each about 1,000 barrels short of what they had last year.

The catch of squid also showed a decrease, in fact, it is estimated that only about one-quarter as many squid were taken as last year. These fish are used mostly for bait and taken together with the shortage of herring, and no other bait frozen, would indicate that there will be a scarcity of bait at Cape Cod ports during the coming winter. Bone squid were plentiful at Chatham and all along the south side of the Cape, but they were no more plentiful than they were a year ago, and following the plan of last year all were caught that possibly could be, the freezers everywhere taking in all they could. There is a lot of bone squid frozen in consequence and no doubt the vessels of the fishing fleet will have to use a good many of these for bait when other bait is used up.

Mackerel were more plentiful than they were a year ago. They were in large schools, so large that one school would have fish enough to fill several vessels. Of such size were these bunches of fish that seines would actually burst under the weight of the fish before they could be bailed out onto the deck of the vessels catching them. The freezers on the Cape had more mackerel frozen up to October 1 than they had all last year, this being said with the thought in mind that there is still two months of the mackerel season to come. Mackerel, it might be said right here, did not strike in the traps in any large quantities, although there were instances of good hauls, but were caught mostly by the mackerel seiners and netters. The first mackerel to strike around the Cape were large fish which came in about the first of August and were followed shortly after by mackerel of about three quarters to one pound in weight. These fish were very plentiful and consequently very cheap, and a lot of them were sold to freeze and salt as there would have been no profit in shipping them to sell on the fresh fish market at Boston.

Bluebacks were scarce indeed this year and only about three schools were caught all together, which is practically not 10% of the catch of a year ago. These fish all were sold for salting and curing. The take of bluefish was about the same as last year, the fish caught running from one-half to two pounds each, and these were taken mostly in the mackerel nets. The traps took only a few. Butterfish were a little more plentiful and ran of good size and brought good prices. Very few of these fish were frozen except at Chatham, and the Chatham freezer has more butterfish frozen than all the other freezers together. There were more striped bass caught in Wellfleet and Provincetown waters than for many years, but Orleans and Brewster reported the catch in decrease of the past few years. So all in all it would seem that the total amount taken was about the same as a year ago.

The flounder catch suffered a severe decrease, it being estimated by the fishermen themselves to be practically cut in halves as compared with the 1928 catch. It is an actual fact that flounders are getting very scarce around Cape Cod. Many observing ones charge this up to the account of fishing during the spawning season. These fish are caught in the spring in large numbers when they are full of spawn, and there is some talk of the actual necessity of stopping fishing during the spawning season if an increase instead of a decrease from year to year is to be looked forward to. There has been an increase in the codfish



catch this year of about 10% over that of 1928. This is due not so much to the larger amount of fish on the fishing grounds as it is to the fact that the fleet of boats catching them has increased quite a bit. There are at least 10% more power dories in the Provincetown fleet than there were last year, and these crafts, being equipped with plenty of power and being exceptionally good sea boats, think little or nothing of going twenty to twenty-five miles to sea to make their catches. They carry but two men, but some of the boats are 32 ft. long and have large horse power engines. They use trawls for fishing. About twelve Provincetown boats are engaged in the haddock fishery. This little fleet fishes from Race Point to Chatham and brings its catches to the Boston market. It did not, in its total catch, register half the amount of the year previous. Practically no pollock were taken around Cape Cod.

This has been a good year for the sea scallopers. A fleet of seven or eight small boats fished about nine miles off Race Point. It is a peculiar circumstance that none of these boats or crews belongs on Cape Cod and only one craft hails from a Massachusetts port—New Bedford. The others all hail from Maine or New York. The catches have been very large, and, as there is always a welcome and, it might be said, a high-priced market, the crews actually shared twice as much money to a man as the fisherman in any other line during the season.

The following report by the principal fishing ports tells the story very well.

#### *Sagamore*

*Butterfish*—Slight increase, lower prices.

*Cod*—Decrease in catch, prices same as 1928.

*Herring*—Increase in catch, prices same as 1928.

*Mackerel*—Big increase in catch, prices about same as 1928.

*Sardines*—Increase in catch, prices same as 1928.

*Bone Squid*—Catch same as 1928, prices same as 1928.

*Bait Squid*—Very scarce, prices about same as 1928.

*Whiting*—Double the catch of 1928, prices about same as 1928.

#### *Barnstable*

*Butterfish*—Increase in catch, lower prices.

*Mackerel*—Decrease in catch, lower prices.

*Bone Squid*—Big increase in catch, prices about same as 1928.

*Bait Squid*—Decrease in catch, prices about same as 1928.

*Cod*—Catch same as 1928, prices same as 1928.

*Whiting*—Decrease in catch, prices about same as 1928.

#### *Yarmouth*

*Mackerel*—Catch about same as 1928, slightly higher prices.

*Bluefish*—Large increase in catch, prices good.

*Squid*—About same as 1928, higher prices.

*Butterfish*—Scarce.

*Lobsters*—Increase in catch, higher prices.

#### *Provincetown*

*Mackerel*—Increase in catch, prices same as 1928.

*Haddock*—Increase in catch, higher prices.

*Cod*—Increase in catch, prices same as 1928.

*Herring*—Decrease in catch, prices same as 1928.

*Whiting*—Catch less than in 1928, lower prices.

*Squid*—Decrease in catch, lower prices.

*Flounders*—Decrease in catch, prices slightly higher.

*Bluefish*—Large increase in catch, good prices.

*Sea Scallops*—Quite plentiful, good season.



At Chatham (a very active and component part of the fisheries of Cape Cod), the season, generally speaking, was a good one. The freezer had a good year. As to squid, more were taken than ever before in the remembrances of the everyday fishermen, so many that traps were almost sunk with the weight of fish. Unfortunately they came over a period when it was sometimes impossible to market them at a profit and many hundreds of barrels were dumped. Striped bass were more plentiful, but not so many were taken as last year on account of the prevailing bad weather when the fish were in. However the increase in the numbers is very encouraging. More bluefish were in the bay this year than for many years back. The first run of bluefish was small, running from  $1\frac{1}{2}$  to  $2\frac{1}{2}$  pounds, but the second run appeared to be of large fish, many of which weighed down the scales at 6 and 8 pounds. Some of these fish were taken in the traps and a great many were taken by the heave and haul method.

Butterfish were not in such good supply as for a few years previous and also the size was smaller. There was only one spurt of large butterfish and that did not last long. The scallop season was good with the finest kind of scallops both as to size and quality. But here, as at other points along the Cape, the fishermen complained of the low price from the boats.

Taken as a whole, the fishing season at Chatham, while satisfactory, revealed a catch in size not as large as the previous year, and with probably less money made for the fish taken.

At Hyannis the flounder fishing opened on October 15 when the crafts from Provincetown began operations out of that port. At the start ten boats were engaged. The catches were so good and returns so satisfactory that the fleet rapidly enlarged to where thirty boats (not all from Provincetown) were operating from this port and landing their catches daily. The fish taken seemed to run somewhat larger than the early catch of last fall, but reports were received of flounders landed along the Cape that, though smaller in size, were, because of their thickness, very much favored in the market. At the opening of the season these boats averaged a catch daily of about seven barrels, figuring 160 pounds to a barrel. Practically all of the catches went to New York, but so great was the demand and the competition of buyers that before the fleet had been in operation many days eight or ten buyers had congregated from New York besides the local and Provincetown buyers who usually accompany the fleet. Nine and ten dollars a barrel were paid cash on the wharf for these fish. Practically no small flounders were taken by this fleet and the season progressed with good success, and at times with increased catches. However, about November 23 and 24 news reached the fleet that the boats at home at Provincetown were finding the flounders plentiful. A very few days afterwards the Provincetown boats departed for their home grounds and left the field practically clear to the local boats. Contrary to newspaper reports no catches of "carbolic" flounders were taken and that no shipments were turned down at New York on this excuse.

### *Buzzards Bay Fisheries*

In this famous Bay which has been the subject of so much fisheries legislation in the past 15 or 20 years, there was an increase in the hand-line fishing. This is carried on mostly for the sport and home table consumption. A part of the increase is due to a shortage of full-time labor in New Bedford and to fair weather on Saturdays and Sundays when people have the time to boat and fish. Reports are that good catches of tautog, scup, tinker mackerel and bluefish have been made and that also there has been a gratifying increase in the take of squeteague. Also that some hauls of striped bass were made from the shores. Along with this it can be said that during the season bluefish running from  $1\frac{1}{2}$  to 6 pounds in weight were taken off-shore in "goodly numbers."

The traps in the Bay proper, are reported to have done not as well as last year. One observer remarked "some of them keep fishing the traps simply because they have them." The scallop season was successful with trade very brisk, although some dissatisfaction was reported as to price from first hands. By November 26 the report was to the effect that the season seemed to be almost over at some of the points at the head of the bay. It is noticeable that at Dartmouth there was an unusual increase in the take of scallops, especially in Slocum's River brook. In this connection it should be remembered that the taking of mersal and demersal fishes except for a few traps which have authorized locations is confined wholly to hook and line fishing as the bay by statute is practically closed to fishing by seines and nets and other appliances.

Observers in the various towns are gratified at the continued increase in the take of bluefish, tautog, sequeteague and striped bass and believe that the Bay once famous for its large catches of these sporting fish, will again come into its own.

At New Bedford, one of the two principal fishing ports of the Bay, reports are as compared with the previous year the mackerel landings were not up to the 1928 figures and that as a whole the receipts at the port of all kinds of fish by the comparatively large fleet which uses this port at certain times during the year, did not total to the 1928 figure. Prices paid averaged well, but most of the fine fleet of high-powered draggers, and baby trawlers which call New Bedford their home town, landed generally at Boston and New York. The swordfish landings totalled 1472 fish, an increase of fully 25% over last year. Quite a majority were taken on the grounds to the westward of Georges. Of these fish 8 averaging about 225 pounds each in weight were jellied and condemned.

The port of Woods Hole, one of the active fish markets of prominence along the coast and located at the eastern entrance of the bay, reports a very successful fishing season. The port had the distinction of having the first swordfish landed there instead of at Boston as is the usual custom, when the schooner *Liberty* of Edgartown pushed in on June 4 with twelve fish, all taken to the westward, for which Captain Claude Wagner and his crew were paid the fine price of 45 cents per pound.

Less butterfish were landed than in the previous year and the price averaged less, for the reason that the general run of "butters" was smaller and naturally not as welcome in the market as the "jumbos." More haddock and yellowtails were landed than last year. An encouraging sign for the port is that more boats were landing their trips than ever before.

More tautog were landed than last year, but the trap fishermen had the poorest year for at least twelve years. As at the head of the bay, Woods Hole reports that the handliners did very good. The swordfish totals figure about 200 less than in 1928, but a remarkable feature was the lateness in the season with which these fish remained in the so-called western waters, for as late as October 15, swordfish were landed from Sound Ledge.

The fishing interests feel greatly encouraged over the large number of bluefish taken and landed. These fish, which ran from 1½ to 6 pounds seemed to come from all directions, from Buzzards Bay, the Vineyard and Nantucket Sounds. Less striped bass were taken than during the previous year. More squid were taken, but as at Chatham it was difficult to market them to advantage. Very few herring were taken and also less scup were landed than last year, the latter bringing less price due to small size. There were good landings of mackerel in May, followed by a run of bull's eyes in June, but speaking generally the mackerel landings were not up to those of last year. It is gratifying to note that the lobster catch showed a remarkable increase over last year. The prices on the average were much higher, although there was a sharp decrease at



times, due to the large Nova Scotia landings at Boston. The scallop season was very good with "eyes" of good size. Taken all in all, Woods Hole has reason to feel satisfied with its fisheries season of 1929.

The following pointed paragraphs sum up concisely the fisheries for the year:

*Mackerel*—Increase during May and June. Rest of season decrease. Twelve caught with rubber bands. The decrease during summer was due to presence of frigate mackerel, sometimes called Boo Hoos, which averaged 13 pounds each of which 30 barrels were caught. These are the first seen here in the last ten years, and as soon as they show up, the mackerel disappear.

*Flounders*—Increase in yellow tails due to good prices, which caused more fishermen to be out, and they continued all winter fishing in back of the islands.

*Swordfish*—Slight decrease; less caught on shore than last year. Two "jellies" caught. Weather good which made extremely long season, the last two fish being brought in October 14.

*Codfish*—Average amount about the same as 1928, but run very small and poor market.

*Haddock*—Big increase due to good prices which caused more men to fish. Ran larger than last year, and boats fished all winter.

*Squeteague*—Slight decrease, but ran larger than last year. About 800 pounds taken for the whole season.

*Scup*—Slight decrease, more boats fishing, but less fish.

*Striped Bass*—Slight decrease this year.

*Bluefish*—Very large increase which ran in two schools, one school averaged 2 pounds per fish, the other from 4½ to 5½ pounds per fish. No tinker blues caught.

*Porgies or Menhaden*—None caught this year.

*Tautog*—Large decrease this year owing to recent restrictions in Buzzards Bay.

*Alewives*—Slight decrease in traps but more ran in rivers. Market poor.

*Squid*—Large increase, perhaps ten times more than last year. No summer squid caught.

*Bull's-eye mackerel*—Increase in large size, decrease in small. Total catch decrease over last year.

*Butterfish*—Decrease this year, but ran good size what there were.

*Lobsters*—Marked increase this year, ran good size, but not many jumboes. Good catch in spring, also during September and October.

*Traps*—Poor season due to low prices and scarcity of fish.

*Worms*—Worst year ever known, due to long, hot, dry summer which warmed up the waters and made ideal conditions for these pests.

### *Nantucket Fisheries*

Where but a few years ago the fish landings at Nantucket were in excess of forty thousand barrels, practically all of flounders, it is not consoling to note that during the past year but 8,500 barrels were landed. This is due to the exhaustion of the on-shore grounds, compelling the fishermen to go further and further off-shore for their catches. Such fishing necessitated larger crafts, and these found it more profitable to run their trips direct to the New York and Boston markets.

The smaller crafts do not operate during the heavy weather season, which accounts in quantity measure for the decrease in the landings at this very handy place of shipment. The above does not mean that the catch of flounders by the fleet as a whole is being reduced, for it is probable that the opposite is the fact and that the flounder fishery, which



is being pursued with such intensity, is showing a relative increase of catch year after year, so much so that there is great need of a broad survey by the United States Bureau of Fisheries. Certain it is the flounder fishery, which a few years ago practically centered around Nantucket, has moved away and we wish to assist in every way possible to bring about its return.

Our deputy's report for the year from the Island gives the following figures:

Flounders landed for the year to December 1, 1929	8,500 barrels
Quahaugs (and this is the take locally)	15,064 barrels
Cod and haddock landed and shipped	3,763 barrels

During the past year about sixty boats have been engaged in fishing and the catches have been very good as compared with last year, although about all fish caught have been bought by New York buyers. The scallop season has been one of the best for years, there being about eighty boats engaged and prices have run from three to four dollars a gallon. The great run of bluefish in these waters is noted elsewhere.

### *Martha's Vineyard*

In reporting the result of the fisheries of Martha's Vineyard it should be borne in mind that conditions on the eastern and western ends of the Island sometimes are quite different.

For the eastern end of the Island the report is:

Cod and haddock were more scarce than in an average year, with only a few small vessels dragging. The blackback flounder catch was somewhat below the average while yellowtails were very plentiful. In fact, more of these delicious fish were taken than for a number of years.

There was a very large run of alewives. Any falling off in the catch was due to less fishing in the latter part of the season because of the dullness of the market which takes the alewives salted. Also the scale fish market was dull.

There were hardly any flukes taken. Scup and sea bass were caught in about the usual amount, but the market was low, with only a boat or two fishing for them for the local market. The take of striped bass was about the same as for the last few years and was very encouraging from the fact that for quite a long time previously practically none of these fish had been taken to any extent. The bluefish appear to be returning. Probably over 1,500 of these fish were taken here by trolling and fishing from the shore as against about twenty fish the previous year and also practically none for ten years before this.

The season of 1928-29 on scallops was rather below the average, but as regards the catching period up to the close of this report (November 30) scallops were reported very plentiful but local boats do not start fishing until November 15. As to quahaugs and little necks more were garnered than for some years. Clams were very scarce. Some disease seems to have been prevalent during the last two or three years as practically all the clams taken in large sections are found dead.

At the western end of the Island and the vicinity of Buzzards Bay it can be said that the traps have not done as well this season as usual. The run of scup in the spring was early and had practically gone by before the traps were put in. Blowy weather made the excuse for the traps being put down later than usual. The handline fleet that usually follow scup had varied success. These fish did not bunch up as they usually do and the fleet was pretty well scattered with the result of small catches. The lobster catch was better than any year since 1920 with prices about as usual until the last week in August when due, it is claimed, to the influx of the Nova Scotia lobsters at the Boston market the price dropped materially. It seems to be the opinion of the fishermen of the

Vineyard that there should be a duty imposed upon all shipments of lobsters from Nova Scotia and also that a larger duty should be imposed upon fish from Canada.

Swordfish were fairly plentiful on the inshore grounds in the proximity of Cox's Ledge. These fish hung on late with fairly profitable fishing all through September. Summer flukes were more plentiful than for the past few years, the draggers doing well in the Sound during July and August.

There was a good run of fall mackerel but prices were low owing to the large supply from eastern points. There was a marked increase in the number of bluefish caught this season and they ran to better size, also there was a good run of striped bass which proved profitable to the commercial fishermen as well as furnishing plenty of sport for the rod and reel men. It is too early to predict the fall run of cod and haddock.

Summing up these two reports from the opposite ends of the Island, together with the report from the coastal warden, the result is as follows:

*Scup*—Season was very poor. The spring run of scup arrived two weeks earlier than usual and the trap fishermen, not expecting this, did not have their gear ready. The second run did not hold together and were very hard to find. They seem to have kept on the move at all times. Those that were taken were all very good fish and ran to large sizes.

*Pollock*—Due to the warm weather they showed up early but did not stay, and very few were taken. The small pollock that usually show up in the fall did not appear very plentiful and only a very few were taken.

*Mackerel*—Not as many big mackerel taken as there were last year. There were more small mackerel than in many, many years. They stayed around for months but did not come inshore much. One of the theories was that they were driven off by the bonita.

*Bonita*—No great numbers were taken but there were more around the Island than for many years.

*Bluefish*—Much more plentiful than for many years and ran quite large as to size, in fact, more large bluefish were taken this year than the total catch amounted to during the last five years. This may have been due partly to the great bodies of squid that were present in local and adjacent waters. The traps at Lambert's Cove were so full of squid at times that they could not be hauled and had to be dumped.

*Striped Bass*—The same may be said about striped bass as bluefish. More were taken and of much larger size than for a good many years.

*Sea Bass*—The catch ran smaller than last year. As a whole the fish ran smaller as to size. Handliners found some but had as much of a problem to keep on them as they did with scup.

*Flukes*—The catch was average, the size way ahead of other years. Blackbacks and yellowtails up to the present time have run average in numbers, but most have run small as to size. Have to go way out wide to get large fish. Yellowtails are not quite up to average in numbers.

*Haddock*—There has been a steady increase in the haddock catch for the last few years and especially last year. This year they have shown up in greater numbers than for many, many years. They differ from the schools of years ago in that hardly any are taken with spawn. They all run to big heavy fish.

*Cod*—Very plentiful. The bottom is practically alive with them and the schoolfish are very much better as to size than in other years. The ledge cod are running very small on about a 60-40 basis, 60% marketable and 40% scrod.

*Swordfish*—Swordfish were scarcer than last year. There were plenty of them but they did not come inshore, due to the fact that when they struck on there was a scarcity of mackerel.

*Whiting*—Considerably below the average.

*Smelt*—The season was average, not a large amount taken commercially.



*Eels*—Eels are away ahead and running larger than for many years, especially the pond eels.

*White perch*—The season on white perch was about average—not quite as many taken as in other years due to the fact that they did not fish for them.

*Wastefish*—Much more wastefish than usual (robins, sculpins, dogfish, etc.).

*Lobsters*—Catch as a whole way above the average. There were quantities inshore, but not many taken and a large number of those were seed lobsters that had been marked and liberated. Offshore the catch ran better than for a good many years.

A large salmon weighing about fifty pounds was taken in a trap at Gay Head. There were a few sturgeon seen but none were taken. There were more frigate mackerel taken this year than for many years.

### *Boston Fishing Activities*

The port of Boston, which is generally conceded to be the largest fishing port in the new world, has just concluded its most successful year both as to size of landings and business prosperity. The increase in catch from last year in round figures is 46,881,159 pounds and there is every indication that this pleasing state of affairs will continue providing that the fish continue to inhabit the fishing banks in the same quantities as at present. There is so much that could be said about the industry as at present conducted on the Boston Fish Pier that a volume would be necessary to tell the complete story. However, it can be said that fleets and fishermen have done better than ever before and that the concerns have prospered accordingly. The main features of the year at the Pier have been a great increase in the number of new crafts which have been built to engage in fresh fishing, the marked increased demand for fish fillets, and the large increase in the receipts of fresh mackerel. These three items alone are enough to indicate that prosperity has been the lot of the industry.

As is usual in these reports, we take pleasure in making public the opinion of Fred F. Dimick, Secretary of the Boston Fish Bureau for over 47 years, whose comments and judgment are excelled by none. Mr. Dimick says:

"In the spring of the year good catches of haddock were made on Georges Bank. In the fall of the year, however, the fleet found fish scarce—scarcer than they have found them for a number of years. The handliners had rather a poor season, owing to the scarcity of codfish.

"The receipts of fish at Boston from the fishing fleet show an increase in practically all kinds of fish except large codfish and halibut.

"The receipts of mackerel at Boston show a gratifying increase. This was largely due to the catch of small mackerel and blinks, a large body of which were off the Massachusetts coast during the fall months and resulted in good catches by the seiners. The crew of one of the Italian seiners up to the first of November shared \$3,000 each, and others have made good shares.

"The mackerel fleet that fished in southern waters was about the same size as last year, but the netting fleet was a little larger. Owing to the bad weather the seiners had a poor season. The netters had a comparatively good season. The first mackerel were landed by the southern fleet April 8, a small catch of 2,000 pounds of two-pound fish. This was four days earlier than the first catch was landed last year.

"Importations of mackerel into Boston from Nova Scotia were light. When mackerel were plentiful on that coast, prices were so low in our market that they could not be shipped here at a profit.

"The receipts of swordfish made a new record, aggregating 27,463 fish,



compared with 18,519 the previous year. The fleet fishing on Georges Bank was very successful owing to the weather conditions that were unusually good. The catch to the eastward and on Cape Shore was not so good. The foreign receipts amounted to 2,035 fish, compared with 2,387 the previous year. A large quantity of swordfish were put into cold storage.

"Swordfish are now being received from the West Coast. The fish are just the same as the Atlantic coast fish, but run large in size. The cost of laying them down here is high. Six cars of these fish have been received this year to November 1st, and this is a business that promises to increase in the future.

"Salmon and halibut have been in good supply from the West Coast.

"A comparison of the number of vessels that landed fish at Boston the past year with last year is as follows:

	1929	1928
Draggers, large and small	198	182
Steamers	60	41
Line vessels, handliners and trawls	66	72
Swordfish	76	79
Mackerel	103	113
Halibut	17	23

"The shipyards have been busy building new vessels. There are 15 steamers either contemplated or under construction and a number of draggers.

"In a bad storm in February the steamer *Seiner* was lost with all of the crew. From January 1 to date, fourteen vessels have been lost. Eight of these vessels were destroyed by fire.

"The receipts of fish from Cape Cod have been light as the catch of all kinds of fish in that section was disappointing."

### RECEIPTS OF FRESH FISH AT BOSTON, DIRECT FROM THE FISHING FLEET

	Pounds Dec. 1, 1928 to Nov. 30, 1929	Pounds Dec. 1, 1927 to Nov. 30, 1928
Large Codfish	23,576,163	24,426,905
Market Codfish	15,786,557	15,406,558
Cod Scrod	280,386	87,890
Haddock	153,624,371	121,587,472
Haddock (scrod)	9,647,206	12,143,585
Large Hake	10,567,876	5,663,183
Small Hake	3,420	73,000
Pollock	4,286,822	2,954,785
Cusk	2,170,200	1,560,014
Halibut	2,609,119	3,286,376
Mackerel	21,232,279	15,114,960
Swordfish	4,096,085	2,263,437
Miscellaneous	11,675,599	8,106,759
Total	259,556,083	212,674,924

#### *The Gloucester Fisheries*

During the past year there has been a gratifying increase in the landings of fish at this old port, and the firms engaged in all lines of the fish business have been prosperous. New crafts have entered the fisheries and new concerns have "hung up their shingle," and all seem to be doing well.

There has been a noticeable decrease in the number of fresh fish trips from the eastern banks, capacity trips for salting and curing, and their place has been taken by quick caught fares on nearby fishing grounds which can only mean a better quality of fish going into the salted and packaged product. The fresh fish business has really staged a remarkable comeback. At the present time it is safe to say that the market needs of the various concerns and dealers here are waited upon by no less than 115 crafts, large and small, the smaller craft predominating.

Some of the firms of the city have gone into the filleting business, and with the rejuvenation of the fresh fish business and the marked increase in the demand for salted and pickled fish it is easy to see that both fishermen and dealers of Gloucester have reason to congratulate themselves. More fish fresh for market and table consumption were landed than for any similar period since the ill-fated Gloucester Fresh Fish Company closed its doors years ago.

Another notable feature of the season was the unusually large catch of small mackerel. The old fishermen claim there were more mackerel schooling along these shores than for a great many years. During the months of August and September and early October, so great were the catches that the fresh fish markets of Boston and Gloucester were unable to absorb the landings, with the result that during this time more mackerel were salted on the wharves of Gloucester than ever before, and it can be safely affirmed that a great many more would have been landed to salt if the employees on the wharves could have taken care of them. These men worked early and late, Sundays and holidays included, and are deserving of great credit for their cooperation in working out this extremely difficult problem of how to take care successfully of the excess catch. Furthermore, the fishermen themselves should be commended for the splendid spirit displayed in willingly and many times voluntarily discarding large quantities of fish, which, while perfectly sweet, were in too soft a condition to be marketed.

The number of barrels of mackerel salted was approximately 35,000, and considering the fact that they were small fish, counting from 350 to 500 to a barrel, it is easy to figure that there were salted on the wharves of Gloucester a total of fourteen million pounds of fresh mackerel.

This large body of small mackerel which frequented our shores is considered by the fishing captains as a good sign for the future, and the outlook for this branch of the fisheries is very encouraging. These blink mackerel were practically the same size as those that made their appearance off our harbor in the latter part of August 1923, which body of fish the mackerel fishermen have been working on every year since. It is fair to assume that they may have this year's spawned fish to work on for the next four or five years.

Another encouraging feature is the vast improvement in the quality of codfish that were landed for splitting and salting purposes. This is due to the fact that the fish caught were the results of very short trips which the vessels are now making, the time gone averaging from a few days to little more than one week where previously a ten or twelve-day trip was the best that could be expected, and many were much over that.

The local swordfishing fleet on the whole had a very profitable season, finding fish plentiful and prices holding up well. There is a growing demand for these fish and the men who go swordfishing have good reason to be hopeful for the future. The number of vessels engaged in the halibut fishery was comparatively small, and while a few vessels did well, on the whole the season was below the average.

The following table gives the landings by American fishing vessels at Gloucester as reported by the United States Bureau of Fisheries from December 1, 1928 to November 30, 1929.

Cod, fresh:	
Large	7,200,231
Market	1,596,645
Scrod	13,740
Cod, salted:	
Large	918,875
Market	155,322
Haddock, fresh:	
Large	17,596,905
Scrod	1,224,560
Hake, fresh:	
Large	505,956
Small	6,130
Hake, salted:	
Large	11,885
Small	920
Pollock, fresh	4,826,084
Pollock, salted	2,795
Cusk, fresh	119,025
Cusk, salted	9,470
Halibut, fresh	46,459
Halibut, salted	460
Mackerel, fresh	14,727,702
Mackerel, salted	143,210
Flounders, fresh	652,196
Swordfish, fresh	11,181
Herring, fresh	79,600
Herring, salted	2,928,112
Other, fresh	480,557
Total, fresh	49,086,971
Total, salted	4,171,049
GRAND TOTAL	53,258,020

It will be noted that this table shows a gratifying increase over the amount landed at this port last year, and, as was noted last year, when the real standing of Gloucester as a fishery port is to be considered, the fish landed from other sources that do not come within the scope of the above table and which amount to a very high total, should be considered. For this reason the following estimated data is given, with the assurance that the figures are secured from reputable sources and are, to say the least, conservative:

	Pounds
United States unregistered crafts under 5 tons	5,000,000
Cured fish from Maine ports	2,000,000
Fish, not the product of American Fisheries, and also from Treaty coast	18,785,625
Fresh fish trucked to Gloucester from the Boston Fish Pier	10,000,000
TOTAL	35,785,625

When this latter total is added to the total given by the United States Bureau of Fisheries within its prescribed limitations, making the port total for the year 89,043,645 pounds, it will be seen that the showing of Gloucester is one to be proud of and that the landings of this ancient port are annually increasing.



## SHORE FISHERIES

*General*

A summary of the reports of the shore net and pound fisheries, as required by Section 148, Chapter 130, General Laws, follows:

Number of men engaged, 117; number of boats, 73; value of boats \$30.-147.00; number of fish pounds, 37; value of fish pounds, \$40,950.00; number of nets, 286; value of nets, \$19,645.00; catch in pounds:

Alewives	17,036	Salmon	—
Bluefish	6,808	Scup	8,141
Butterfish	63,972	Sea Herring	1,105,359
Cod	28,748	Shad	3,936
Flounders	4,546½	Squeteague	969½
Mackerel	807,463	Squid	1,132,040
Menhaden	—	Tautog	10,174½
Pollock	50,393	Whiting	759,915
		Other edible or bait species	321,351

Total pounds, 4,320,852½; total value, \$91,030.51.

*The North Shore*

The report from the shore fisheries beginning with Salisbury and ending at the Gloucester line show in some respects that the past season has been a little more prosperous than that of the preceding year as far as the taking of cod, pollock, hake and haddock are concerned. Fishermen in this locality were favored with good weather, an abundant supply of bait and an absence of any great number of dogfish. Naturally, this all tended to hold a good school of shore fish for long periods and contributed to the good result.

During June, Newburyport harbor and waters just off the beaches adjacent produced an exceptionally good catch of large market cod. They were mostly taken by handline and trawls and on the flood tide as far up Newburyport harbor as the Hump Sands. Great schools of "jogger" herring was evidently the inducement for their remaining there. On one Sunday in June there were counted 100 persons fishing from boats inside of the jetties, and there were half as many more fishing from the rocks off the jetties. Two or three hundred weight of these fishes were taken by many of these boat fishermen at a tide. But few large pollock were taken this year and the catch ran to pollock weighting about three and four pounds each. A goodly number of hake and haddock were taken by trawl and handline fishermen in Ipswich bay during their respective seasons.

Salisbury and Newburyport each had one or two small power fishing boats and a number of dory fishermen who trawl and handline. These power fishing boats are owned by retail fish dealers, and most of their catches go to supply the local needs for fresh fish. There is diversification in their fishing activities as the different schools of fish strike inshore waters. They drag for flounders principally, but likewise take cod, pollock and haddock in this way whenever the opportunity affords. Some of them this year engaged in the mackerel fishery when these fish were so plentiful in Ipswich bay, seining a great many just off the bar. One fisherman is said to have secured over thirty barrels of mackerel in one haul inside of the jetties. For the first time in a great many years a Newburyport sloop was outfitted to engage in the swordfishery, but met with poor success. The flounder fishery is reported by those engaged therein as decreasing year after year. This naturally is attributed to too much dragging over the same ground, which is none too large in area.

In this district the lobster fishery reached its lowest ebb the past season

and there are few or none who look for an improvement next year. Those interested in the lobster fishery and whose livelihood to some extent or to a large extent is dependent upon the same have different ideas as to what is necessary to bring back the fishery to a semblance of its former productivity. Some desire absolute protection for all adult female lobsters whether they are egg-bearing or not, while others feel that a long period of closed season will soon be imperative unless the situation materially changes.

Clamming in this district at the present time is in a very precarious condition. According to reports received at this office some engaged in conducting it are defeating their own best interests by avaricious practices. It would be very interesting to see the contaminated areas in Salisbury, Newburyport and Newbury opened up to digging through the medium of a cooperative clorinating plant, the whole thing to be conducted in an efficient and common sense business-like manner. Vast beds of large clams now in these areas and which are now going to waste could thus, it is claimed, be utilized for the benefit of all, whether clammers, dealers or the consuming public.

As in the past few years, the Parker River smelt fishery has proved an utter failure, and for no apparent reason. There was a good run of smelt to their usual spawning grounds last spring, with a consequent set of live spawn therein. Of marked interest it is to note that bluefish weighing between one and two pounds were taken in some numbers in Parker River and Plum Island Sound during the summer. This evidence of the return of the bluefish coincides and in some measure tallies with the generally encouraging reports received from the south shore.

The eel fishery is reported to be on the decline. The town of Newbury has seen fit to enact several stringent by-laws regulating this fishery, which they are attempting to enforce. It has been suggested by some interested in this work that since the State has given the towns and cities full right to regulate the fishery, it would behoove other towns to adopt some regulatory measures. The sand eel fishery has been prosperous this season, there having been much local demand for these small fish for bait purposes.

During August, September, and October, abundant schools of mixed sized mackerel appeared in these waters. Many were taken by hook and line as well as by seine and in gill nets. It is reported to this office by what is considered good authority that in recent years such good mackerel fishing in this district has not been known, there being several fishermen who jigged over two barrels a day. Many of these fish were taken right in Newburyport harbor and as far up as the Towboat wharf.

No herring of any size have been in appearance in these waters up to the present writing but there have been a lot of "jogger" herring and alewives and one spurt of small summer squid.

The white perch fishing in the Parker River this spring was very good and attracted hundreds of fishermen.

In connection with this report it is deemed advisable to quote the opinion of the coastal warden of this district on some vital fishing matters. He says, referring to the clam situation:

"The contaminated shellfish areas of Newburyport harbor, which includes areas in the towns of Salisbury, Newburyport and Newbury, are under good control and very few shellfish are taken therefrom. At Ipswich we are faced with a far different situation as far as the contaminated areas are concerned. Clam diggers are on these areas every day. These flats are well protected, being surrounded by barren marshes, and these clambers post sentries with high powered glasses and it is practically impossible for a warden or even a stranger to get within a quarter of a mile of them. Even the series numbers of the cars used by the wardens are known and the minute one of these autos is spotted a fast motor boat goes down the river and gives the violaters warning. Also there are



many people who do not believe in the present clam law restrictions and who warn the clammers and in this way do everything they can to help the violators. My idea is that just as long as there are clams in good quantities in the contaminated areas, and this is about the only place now on the North Shore where there are any clams left, practically all the good areas being dug out, just as long do these clam violators take a chance. There is no doubt but that a good many of these diggers are egged on by crooked clam dealers. The conditions at Ipswich are bad and I think that this area will be a hard one to handle.

"Although the clam areas are no larger today than they were at any previous time, the number of diggers has increased ten-fold and autos make it handy for thousands of diggers to get to these clam flats where in the past, before the advent of auto, it could not be done so handily. The town authorities, after they make a good law regarding clams, seem very lax in doing much enforcement of the same. The majority of the clambers are always kicking about every kind of a clam law. They want everyone to help them out, but as far as I can see they are never willing to help themselves. In the town of Newbury the clambers have been the instigators of calling several special town meetings for the purpose of stopping the Rowley clambers from digging on Newbury territory. This fight has been going on for about four years and the situation is right where it started and the clambers themselves are to blame, for no sooner would the town pass a law to benefit the clambers than they would find some fault with it and the men that the town has elected to enforce these laws have done no enforcing at all, and one or two good officers have resigned in disgust.

"All the lobster fishermen in this district continue in favor of the idea of buying the seed lobsters by the State and say it is one of the best things that has been done for the lobster situation and that they hope the practice will continue."

Continuing on from the Ipswich line and covering the so-called Cape Ann-Gloucester territory, the lobster fishery is probably the most important of all in the shore fishery line. This seems to have passed through a fairly good year. The early spring fishing was not as good as usual and through the early summer did not seem to be very productive. However, during the latter part of the summer and throughout the fall, fishing picked up immensely and very good results were enjoyed. It is safe to say that for the entire year the catch will average up pretty well with those of recent years and that the prices averaged a trifle higher. There were several storms of minor importance that caused more or less inconvenience to the lobstermen, but there were no blows that caused any great loss of gear. Seed lobsters were quite plentiful and even though the State is buying them from the fishermen through local agents it seems to be the consensus of opinion in this vicinity that the lobster fishermen themselves, to a great extent, prefer to liberate the seed lobsters as soon as caught and sacrifice the money they could receive therefor when brought to shore, in order that the mother fish may be deposited upon the spots where found and with the least handling. In this district it is hardly necessary to say, and the same report obtains practically along the whole shore, that "shorts" are still being handled by unscrupulous fishermen to some extent. It is largely a question as to how many men can be provided in the coastal warden force to stop this sort of business along the whole coast.

The fleet of dory trawlers, made up for the most part of lobster fishermen who follow this form of fishing during the lull in lobster fishing in early spring and other times, had a very good season, and, except for the fact that it was very difficult to obtain bait when needed, would have done unusually well. These lobster fishermen are fortunate in having good trawling ground so handy as in Boston Bay, Ipswich Bay and off Rockport, and by following this branch as a sideline for a part of the year,



they are able to round out a good year's work. It is true that the gill netters and draggers interfered to no little extent with the operation of this style of fishing, and in the minds of some there should be some restrictions on these latter named crafts that they may be kept further out to sea.

The shore draggers and the gill netters had a very fair spring. Most of them resumed their style of fishing in the fall and the prospects are for a good fall and winter season.

Trap fishing in this locality was very, very poor indeed. Many species of fish that were taken in goodly quantities in years back by this method seem to have changed their habits and for the last few years have not appeared along the coast except in very small numbers. As an example, butterfish and Old England and silver hake, which in years back were taken in unusually large quantities and which were a great help to the trap fishermen, are at the present time almost a rarity in this vicinity. True it is the traps take some herring and mackerel, but the run of these fish is very uncertain indeed and without question the season for the trap fishermen in this district can be almost entirely put down as a blank.

Herring are being taken this fall in the Essex and Ipswich Rivers in goodly quantities by the torching method, but the market seems unable to handle them at this time, so the men engaged both in torching and seining them are unable to operate at full capacity with profit.

The flounder fleet at Beverly and Salem and the small handliners therefrom, for the most part still continue to operate and do very well. They keep their local markets well supplied as well as being able to ship a considerable amount of fish to outside points. Several men are engaged continually in this style of fishing as a means of livelihood, while on the other hand, a great many folks engage in it on Sundays and holidays and "afternoons off" as a pleasurable sport.

Smelt fishing, while not a commercial proposition by any means in this district, is worthy of some consideration and it seems that something should be done to reestablish it hereabouts. In former years smelt fairly abounded almost anywhere from the New Hampshire line to Salem in the rivers and around the wharves, both during the summer, fall and winter, but of late years they seem to have disappeared almost to the point of extermination.

The clam industry has passed through a very successful year financially and with the closing of more flats on account of contamination, together with a constant increase in the number of people engaged in digging them, it is nothing short of miraculous that the supply holds out. The flats in this district are still producing fairly good digging even after being combed all summer long and a good set of young is assured in most places. With the constantly increasing demand for this great delicacy and the impending danger of its extermination it behooves all those at all interested, either commercially, financially or from a conservation standpoint, to stand by and do something before it is too late and attempt to prevent such a catastrophe as "the passing of the clam."

Exact figures of catches of fish landed at the smaller ports are very hard to secure, for few, if any, concerns keep any total record for the ports indicated. However, it is learned that at Beverly from November 1, 1928 to November 1, 1929 there were landed 326,600 pounds of fish, most of which were haddock, yellowtails and cod. The weather during the spring of 1929 according to the fishermen themselves, was not very good for fishing. At the present time there are twelve boat fishermen (not counting the lobster fishermen) and four crab fishermen fishing out of Beverly. At the port of Salem the fishing industry at the present time amounts to but little, there being but very few fishermen engaged and they trawl for flounders simply to supply the local restaurants.

While they were unable to give any accurate figures as to their catch, they did say, however, that their total landings were better than the previous year. At Marblehead there were found only three men that fish the year round exclusive of the lobster fishing. There are many lobster fishermen who go out shore fishing after the weather gets too bad to continue lobstering. The same condition exists here as at Salem and one of the fishermen indicated that in his opinion the catch was not as good as the previous year. Most of the fish caught by the Marbleheaders are haddock, a few cod and flounders being taken. At Swampscott the fishing in the summertime is *nil*, but after the lobster season there are about seven boats which fish with a total of fourteen men, using gill nets. They also say that the 1929 season was not as good as the previous one.

The district covering the territory of Swampscott to Boston reports that while the fishermen are of the opinion that lobsters were not quite as plentiful this year as last, they do tell of an encouraging factor of a very large amount of small lobsters in the pots which would indicate a good season for next year. The trawl fishermen, most of them, report a fair catch of cod and flounders, while some others indicate that the season was poor with them. The net fishermen had a fair year on most all fish excepting mackerel and these seemed to be very scarce at times inshore. As to smelt, these delicious fish were more plentiful this fall than for several years past, most of these fishermen getting good catches. Eels were not as plentiful in the Saugus and Pines rivers as in other recent years, but there has been advanced no reason for this and it possibly may be taken as one of the "ins and outs" of the business.

In this district there is only a small area open to clam digging and this is badly depleted by the many diggers practically combing on the grounds and nothing being done to re-seed these flats. The first part of the season they got very good digging, and later on they met with comparatively poor success, while the reports are that in the contaminated areas there are plenty of clams. The crab fishermen had good fishing the whole season.

The Boston Harbor district offers little opportunity for fishing and also little opportunity for clamming, there being no open area and practically all the flats being on the contaminated list. There are those, of course, who, defying and disregarding the law, persist in digging on these polluted areas, and by the amounts of some of them who are alleged to have dug there seems to have been plenty of clams in these places where they should not be dug. From the Boston district there were sent this year to different districts along the shore, large consignments of short lobsters to help replenish the stock in the various localities. These lobsters were seized as "shorts" by the coastal wardens from consignments on the steamer from Yarmouth, N. S. arriving at Boston and bringing thousands of crates of legal length lobsters for the local market.

### *The South Shore*

The marine fisheries from Boston Harbor to the southward, taking in Quincy, Weymouth, Cohasset, Duxbury, Braintree, Hingham, Scituate, Kingston, Hull, Marshfield and Plymouth, ran along in about the same groove as the previous year. The spawning of the smelt in the spring was greatly retarded by the pollution of the streams and consequently what might in time become a very flourishing industry seems to have little chance of getting beyond a sporting proposition. We hope increasing interest will be shown in the restoration of this fishery. The cod and haddock fishing in this district could be termed as normal and practically about the same as the previous year. Quite a number of horse mackerel were taken in the vicinity of Gurnet Light during the summer, and also



during the same season mackerel were found in abundance, but this fall this fishery was very poor and the lack of smaller fish was noticeable. The boats going after herring had a very good year and at the present time torching for these fish is a very profitable business.

The lobster industry in this district seems unquestionably to be getting back on its feet, due to the fact that less short and egg-bearing lobsters have been commercialized. Practically all the local lobster fishing centers have noticed the change this year and it seems to be an opinion of the fishermen that by strengthening the laws the fishing can be placed on a good business basis.

A resumé of the situation in this district would seem to be clearly shown in the following summing up.

Clams—A good season. Much complaint in regard to the restricted area.

Oysters—None in this district.

Quahaugs—None in this district.

Scallops—None in this district.

Lobsters—A fairly good season.

Mackerel—Large number of small fish. No trap.

Codfish—An average season.

Haddock—An average season.

Herring—A good catch of mostly small fish.

The outstanding feature of this season's fishing has been the unusually large number of butterfish in the waters of the district. At one time a trap located near the Plymouth-Bourne line was catching them in large quantities.

### *The Lobster Fishery*

Under the law authorizing the purchase of egg-bearing lobsters 9,047 were bought at a total expenditure of \$8,578.31, and liberated near the localities in which they were taken.

From what this office can learn the plan of purchasing egg-bearing lobsters is working out successfully and even the most pessimistic of the lobstermen themselves are now fully in accord with the retention of the law and the annual appropriation for its upkeep. As a whole many assert it is one of the best single pieces of legislation for the assistance of the lobster fishery that has been passed by the State for many years.

These lobsters when caught and returned to the waters by State agents were punched in the middle flipper of the tail, experience having shown that marking thus would identify an egg-bearing lobster for an indefinite period.

The action of the Division of Fisheries and Game in liberating the egg-bearing lobsters thus taken in as near as possible the same localities in which they were caught, would seem to be bearing fruit from the fact that early in 1929 lobstermen all along the coast reported taking female lobsters with punch marks prominent at the end of the tail, and these, of course, were immediately returned to the waters. In the course of a few years it may be possible to check up on the worth of the State's policy of purchasing egg-bearing lobsters through the increase of small and under-sized lobsters taken in the traps of the lobster fishermen.

During the year, from shipments from Nova Scotia and other points outside the State, there were seized at Boston 8 egg-bearing and 9,456 short live lobsters, all of which were distributed on favorable lobster locations along the whole State coast.

The totals of the tabulation of the returns of the year's fishing, required of the lobstermen by law, follow. The period covered is October 20, 1928 to October 20, 1929.

Number of men engaged in the fishery, 538; number of boats, 685; value of boats \$203,630; number of pots, 40,202; value of pots, \$107,-930.35; number of lobsters taken, 1,100,632; number of pounds 1,644,-



\$85; value of lobsters, -\$845,887.27; number of egg-bearing lobsters taken and returned to the waters, 8,247. (The difference between the egg-bearing lobsters reported herewith and the number reported as having been purchased, undoubtedly is due to the failure of certain fishermen to file their annual reports).

From the returns to the Division of Fisheries and Game for the year it would seem that there is very little if anything to indicate any particular change, either up or down, in the catch of lobsters in the State. It is however, to be noted that evidently the price of lobsters has jumped, to a considerable increase, for, according to the returns of 1928 the value of lobsters taken was \$515,594.73, whereas the value of the catch of 1929, according to returns filed at this office, is \$845,887.27. An apparent diminution of catch of about 98,000 lobsters has no important bearing on a possible increase or decrease in the stock.

As required by Chapter 130, Section 106, General Laws, it is hereby reported that the number of lobster licenses issued in 1929 was 1,022.

### BOUNTIES ON SEALS

The following towns were reimbursed by the Commonwealth for bounties paid on seals, under Chapter 130, General Laws, Section 155. Claims made in 1928, but paid in 1929—Essex, \$2; Kingston, \$2; Norwell, \$2; Rockland, \$2; Rowley, \$2; fees to treasurers, \$2.50. Claims in 1929—Cohasset, \$4; Duxbury, \$68; Eastham, \$4; Essex \$20; Gloucester, \$2; Ipswich, \$174; Kingston, \$56; Lynn, \$4; Marion, \$2; Newburyport, \$4; Provincetown, \$2; Revere, \$4; Rowley, \$10; Salem, \$2; Somerville, \$2; Yarmouthport, \$22; Yarmouth, \$160; fees to treasurers, \$135. Total 1928 claims, \$12.50; total 1929 claims, \$675.

### MOLLUSK FISHERIES

#### *Clam*

Data received from the shore wardens, statistics obtained from those handling clams commercially, and from the diggers, indicate that it was a fair season. The winter was again extremely moderate and the weather conditions favorable to the industry, and from nearly all sections a good set of young was reported for the summer of 1929. The beds in the closed areas are in very good condition and are said to contain large numbers of clams. In those areas open to digging, about 50% of the areas are in fair condition and about 50% depleted. The estimated number of clams dug during the year was somewhat greater than in 1928. The wholesale market prices showed, in most instances, an increase over the preceding year.

#### *Oyster*

From those districts in which oysters are collected, 50% reported a fair season and the other 50% a poor one. The extremely mild winter was of benefit to the fisheries but in only one section was a good set reported for the summer of 1929. The beds are said to be in fair condition. Statistics collected from those engaged in the oyster business indicate that the take aggregated considerably less than in 1928, and the prices which they brought were about the same as in 1928.

#### *Quahaug*

Data obtained from the quahaug diggers indicates a fair season. The extremely moderate weather was favorable to the fishery, and the beds in some sections are reported in fair and in others in excellent condition.

The total number of quahaugs dug during 1928 and 1929 was considerably less than in 1927, and the prices which they brought in the market ranged about the same as in 1928.

### *Scallop*

Those engaged in scalloping reported a prosperous season from those waters from which scallops are taken. The weather, as reported under the other mollusks mentioned above, was favorable to the fishery. The set of young for the summer of 1929 was reported as exceptionally good and in most sections the beds are reported as in very good condition, while in others they are fast becoming depleted. As near as can be estimated the number of scallops taken during 1929 was considerably less than in 1928, and the prices obtained were somewhat higher than in 1928.

### ALEWIFE

As usual the wardens having alewife streams in their district collected the usual statistics of the alewife fisheries operated during the year. They likewise kept an eye on the fishways in their respective districts. The usual routine was followed, except that no adult alewives were transplanted to depleted localities. It is our conclusion that this work should be grouped under the marine fisheries activities, and no work was done as no appropriation had been made to cover it.

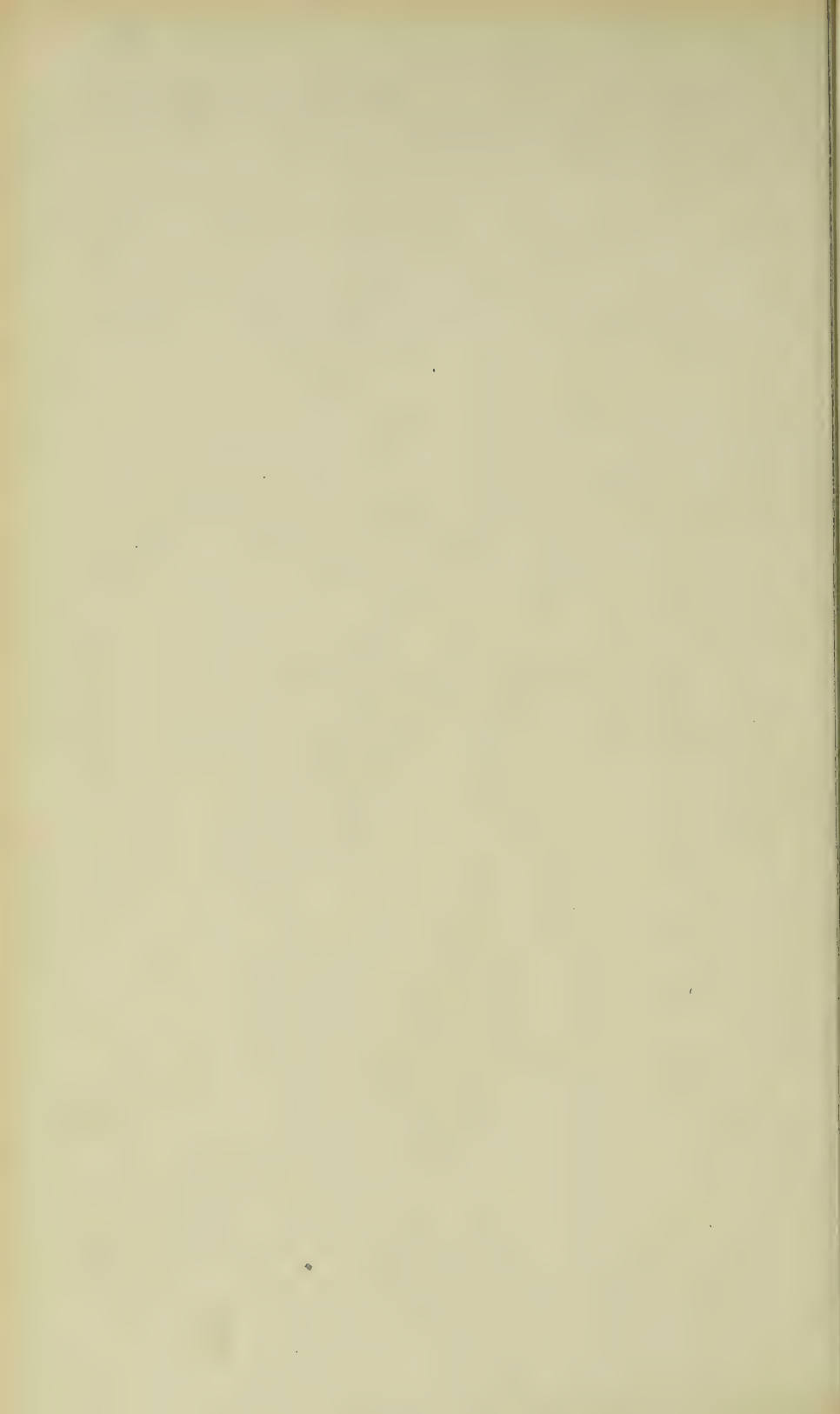
Respectfully submitted,

WILLIAM C. ADAMS, *Director.*

## APPENDIX

No recommendations for legislation were made to the Legislature this year,—such being made, instead, to the special commission which had been appointed, under Section 34 of the Resolves of 1929, to revise and codify the laws relative to game and inland fisheries.





The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

*Mass. Dept. of Conservation*  
Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1930

DEPARTMENT OF CONSERVATION



JUN 24 1931

STATE HOUSE, BOSTON

MASS. OFFICIALS

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## The Commonwealth of Massachusetts

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The Director of Fisheries and Game herewith presents the sixty-fifth annual report.

### GENERAL CONSIDERATIONS

Throughout the State, and at intervals over a period of months, exercises were held commemorating the three hundredth anniversary of the Massachusetts Bay Colony. There was much reference to and reenactment of episodes in our history since colonial times. Hand in hand with the recording of achievements there was evidenced a disposition to survey our past and present practices and methods, to the end that we as a State might profit in the future from the lessons of the past.

A consideration of the status of the wild life of the State with the foregoing in mind is timely. Massachusetts, in common with the rest of the new world, was lavishly populated with a great variety of species of wild life at the time of the arrival of the first settlers. Glowing accounts of the abundance of nature are to be found in the early narratives. It was entirely reasonable for our early and growing colonial population to exploit these resources for subsistence. But as the State became reasonably well settled and the production of food commodities assumed the proportion of an industry, it was no longer necessary to exploit our wild life for the maintenance of our people. It is true that from the beginning of our State government, title to all the wild life was asserted on behalf of all the people. However, as we have stated in recent reports, the State did little more than stake out its claim and rest. For many generations there were large tracts of public land. Most of our private landowners were "land poor". Private rights growing out of private ownership meant little or nothing in relation to the wild life. As generation succeeded generation, a sort of social status obtained whereby a group of our people appropriated the wild life stock to its own use, regardless.

After the settler, who killed for family requirements, came the market hunter, who for generations continued to exploit these wild life resources for personal gain. From what was originally a sprinkling of individuals who followed the chase for sport only, there grew up, in time, a body of men later known as "sportsmen", who took some interest in the wild life largely from the viewpoint of preserving some of it for the recreation of pursuit.

These changes and developments came slowly. From time to time various laws were passed attempting to remedy some condition, but these usually were enacted after the fact. It was seldom that any remedial legislation was proposed *before* the wild life affected had been reduced to the vanishing point. A good illustration is represented by the laws passed in the latter part of the eighteenth century to protect the native deer, which by that time were threatened with extinction throughout the entire State. The enforcement of these laws was left more or less to local authorities, with little or no teamwork throughout the State.

Two hundred and twenty-five years had to roll away before it dawned on our government that ownership carried with it responsibilities. In 1865 the first step was taken to establish a State agency to discharge the State's obligations in regard to its State-owned wild life, in the selection of "Commissioners on Inland Fisheries." Their primary function was to adjust controversial matters with adjoining states relative to obstructions in our streams that affected anadromous fish — particularly salmon and shad. It is doubtful whether the setting up of this agency was due to the awakening of a public conscience to an appreciation of our wild life resources, for in the report of the Commissioners in 1878 it is stated —

"The origin of our Commissioners on Inland Fisheries did not spring from a desire to increase our own wealth, but entirely from a wish to render justice to our sister States, Vermont and New Hampshire; the latter of which passed in 1864 a resolve which recited that, 'whereas the rivers and lakes of this State were wont formerly to furnish an inexhaustible supply of salmon, shad, and other mi-

gratory fish, which have now entirely disappeared from our waters; and whereas there is nothing to prevent the return of such fish but the want of suitable fishways over the dams across the Connecticut, Merrimack, and Saco, and other rivers, and in such numbers as to contribute very largely to the supply of wholesome and agreeable food for the inhabitants of this State; therefore, resolved, that the attention of the States of Massachusetts, Connecticut and Maine, be invited to this subject, and that they be earnestly requested to take early measure to cause such fishways to be constructed . . . as due alike to the relations of comity between those States and our own, to the obligations of national law, and to the interest of those States themselves.'

In March, 1865, a joint committee of the Massachusetts Legislature held a hearing for the parties in interest; and, on their recommendation, two commissioners were appointed the following summer, to investigate and report on the subject. At the following session, the Legislature established the commissioners for five years."

This was the beginning. The commission became permanent and continued to function in the interest of the fisheries (both inland and coastal) for some years, but without relation to other wild life.

It is an extraordinary commentary on our indifference to these wild life resources that not until 1895 was it enacted that

"The commissioners of inland fisheries shall be game commissioners also; and their authority, personal and by deputy, shall extend to the propagation, protection and preservation of birds and animals in like manner as to fish."

The commissioners were then known as "Commissioners on Fisheries and Game," and later as a "Board of Commissioners on Fisheries and Game." Such a board continued to function until 1919, when by a consolidation of all the commissions, its activities were transferred to a Division of Fisheries and Game in the Department of Conservation, with a Director in charge of the work. Such organization has continued to date. It would be interesting to go back into our colonial and following history, and trace out the gradual development of what has crystallized into the State's policy of administering its wild life resources. It has only been within the last decade that the term "administration" has been used. We now understand that the maintenance and upbuilding of these wild life resources is not a sentiment, but a business that calls for the application of modern administrative methods. But an examination of the record indicates that we as a people were surprisingly backward in this field. Despite the fact that Massachusetts was one of the first states to set up an agency to handle this property, it did not for many years live up to expectations. In fact, we find the commissioners in 1899 (34 years after the establishment of the commission) saying, —

"However mortifying it may be to know that Massachusetts, the first State to take action for the protection and propagation of fish and game, has fallen behind other states, we do not acknowledge the justice of the charge that this commission is responsible for it. We have, as our reports will show, constantly urged the importance of better laws and adequate means to enforce them. We are powerless to do anything unless supported by public opinion. . . . We recognize that Massachusetts is to a large extent a commercial and manufacturing State; still, she has within her borders ample grounds, with all necessary environments, for the maintenance of an abundance of game and fish; and it is a serious matter, and one indicating a lack of proper consideration of the needs of our citizens, that the people of this State annually spend many thousands of dollars for recreation elsewhere, which might be provided in this State by judicious legislation, with the result that a large revenue would be retained within our borders."

Again in 1901, the Commissioners said —

"There is undoubtedly a very utilitarian side to the protection of game in this commonwealth. With the passage of years the New England States have become increasingly the favorite resorts in summer and autumn of those of ample means, who find an abundance of game one of the greatest attractions which nature offers. It is well known to be an inducement to some, more powerful than any



other; hence millions of dollars are annually spent by sportsmen in a neighboring State in the enjoyment of hunting, and no insignificant portion of those millions is contributed by citizens of this State. If, then, it is possible by judicious protection to improve our game conditions, so that sportsmen from less favored states and from this commonwealth shall be attracted thereby, it is evident that positive benefit will result, inasmuch as considerable sums of money will be retained within our own borders which otherwise might go elsewhere. It certainly seems wise to utilize as fully as possible the large areas of wild land and covers that still remain in the State, and to that extent hold out an inducement for those with means to build summer homes in many localities which may be largely benefited thereby."

That sentiment was expressed 29 years ago. The argument is equally applicable to present conditions. In recent years this material side of the matter has been stressed. In 1929, there were 134,453 sporting and trapping licenses of all kinds sold by the State. It is a conservative estimate to say that these purchasers spent \$50 each in the pursuit of recreation that would not have been expended for other purposes, or a total of \$6,722,650. Any industry of such proportions may well merit consideration by the government on the material side alone.

On making an appraisal of these wild life resources, the material values represented in the foregoing are less than the health-giving recreation of pursuit and the moral development wrought through the enjoyment of other species of wild life not classed as game. The promotion of a healthy and inspiring environment and contentment of our people is an important function of government. Massachusetts is richly endowed with scenic assets of great variety and beauty. No single factor can so adorn and make vocal all of this wealth of possession, as an abundance of wild life. It permeates our whole social structure, from the housewife, who, on a spring morning, telephones her neighbor that she has seen her first robin, and the child which watches with wonderment the antics of a fledgling bird, to the hunter who on a crisp fall morning goes afield.

Fortunately, the conditions inveighed against by the commissioners in 1899 have been, in a large measure, corrected. Today, the Division of Fisheries and Game administers these wild life resources in the interest of all our people. The public at large, the landowners, the hunters, fishermen and trappers, all have a part in the plan. The wild life resources of the State belong to all the people, and should be administered with the welfare of all parties at interest in mind.

By the same token, the activities of the Division should be financed on the same considerations. At the present time the appropriation for the Division (exclusive of the marine fisheries) is based almost entirely on the revenue produced from the sale of sporting licenses, fines collected by the inland warden force, and miscellaneous income. This revenue comes entirely from the group classed as hunters, fishermen and trappers. Their interest is primarily in that portion of our wild life classed as game and our inland fish, which it is conservatively estimated represents not more than 40 per cent of the total wild life of the State. But the appropriation made on the basis of the revenue supplied by this group is intended to cover the administration of *all* our wild life (exclusive of the marine fisheries) and it appears only reasonable to emphasize the need of additional appropriation to assist in administering the 60 per cent of our wild life (represented largely by our song, insectivorous and non-game birds) in which it can safely be asserted our people as a whole are interested.

#### PERSONNEL

On January 1, 1930, William C. Adams was reappointed as Director of the Division of Fisheries and Game.

A new position was created, the holder to be known as "Supervisor of Fish and Game Permits and Claims," — to which was appointed, as of June 1, Orrin C. Bourne, who up to that time had served as Chief Fish and Game Warden. (A complete report of his activities appears later.)

The position of Chief Fish and Game Warden was filled (as of June 1) by the appointment of Raymond J. Kenney, formerly Fish and Game Warden Supervisor.

The vacancy created by Mr. Kenney's promotion was filled by the appointment of Carl E. Bates, a member of the inland warden force.

## FINANCES

In previous reports we have explained the various steps by which the general budget is made up under which the State's business is financed. This report will be limited to a consideration of the revenue of 1929, the appropriation for the present year, and the Forecast which we have filed in connection with the budget for 1931.

In discussing the revenue and appropriation of the Division as a whole, we have continued our practice of several years past of dividing it into three parts, to be entitled from this time on: "Part I — Administration of Wild Life classed as Game (including Fish), together with the Work of the Central Office;" "Part II — Administration of Wild Life *not* classed as Game, including Sanctuaries;" and "Part III — Administration of the Marine Fisheries."

The total revenue for 1929, subdivided under these three parts, was as follows: Part I, \$279,636.42; Part II, nothing; Part III, \$11,490.90. The total appropriations for 1930 were: Part I, \$298,950; Part II, \$3,700; and Part III, \$71,800.

Although the revenue under Part I was increased, in round numbers, \$30,000 over the revenue for 1928, the appropriation for 1930 was on the same relative scale as the appropriation for 1929. This appears to confirm the statement made in previous reports, that the appropriation for Part I, covering what the Division does for the anglers, hunters and trappers, is based largely on the revenue from this group of the preceding year.

Although no revenue is in prospect from that branch of our activities included under Part II, a small appropriation has been made annually (and in recent years of an equal amount).

It is a great satisfaction to report a substantial increase in the appropriation to cover Part III as compared to the revenue produced. It shows that the marine fisheries have at last been recognized and the groundwork laid for increasing helpful activities in this field.

In filing with the Budget Commissioner in October the Forecast for 1931, we continued the practice of sub-dividing the work into the three divisions above enumerated. In the Forecast we are required to estimate the revenue for this year and for 1931. For 1930 we estimated a revenue about equivalent to 1929, but with some falling off under Part III. For 1931, by reason of the upward revision of license fees which goes into effect on January 1 next, we estimated an increase in the revenue under Part I of \$90,000 in round numbers. But, inasmuch as the appropriation for Part I may be based largely on the revenue of the preceding year, the Division may receive no corresponding appropriation to match this increase until 1932. For Part II we estimated nothing. For Part III, almost the same as for this year.

The appropriation suggested for 1931 to match this year's revenue was in excess of what we are likely to receive if the ratio between revenue and appropriation of the past few years is maintained. However it is less than has been suggested in the Forecasts of recent years.

The Forecast is filed on or before October 15 in a given year, though the fiscal year does not end until November 30. This year we followed the annual practice of sending to the Budget Commissioner a letter commenting on the Forecast, which summarizes the situation, and is as follows:—

"NOVEMBER 14, 1930.

"CARL A. RAYMOND, Esq., *Budget Commissioner, Commission on Administration and Finance, State House, Boston, Mass.*

"DEAR COMMISSIONER:— We herewith submit the following propositions for consideration in connection with the appropriation for this Division for 1931.

"In making up the Forecast we have adhered to the practice of previous years and divided it into three parts, to be entitled from this time on as — 'Part I — Administration of Wild Life classed as Game (including fish), together with the Work of the Central Office'; 'Part II — Administration of Wild Life *not* classed as Game, including Sanctuaries'; and 'Part III — Administration of the Marine Fisheries.'



"You will note on 'Summary Budget Form 3' the estimated revenue for 1930 to be — Part I, \$280,674, or practically the same as the revenue produced in 1929; Part II is omitted, for no revenue is anticipated; Part III, \$9,471. In making up these estimates we have separated the fines collected by the inland warden force from those collected by the coastal warden force, and included them in Parts I and III, respectively. These figures do not represent the exact division of the fines, because the remittances from the courts to the State Treasurer are in lump sums, designated in some such general way as 'fines for fish and game law violations', without specifying the nature of the several violations which the remittance may cover. But the office of the Fish and Game Division has detailed records of the fines *imposed* and we have divided the fines *paid* in the same proportion.

"You will note on 'Summary Budget Form 3' the estimated revenue for 1931 to be — Part I, \$371,395; Part II is omitted, for no revenue is anticipated; Part III, \$9,478. The upward revision in the license fees which goes into effect on January first next, accounts for the expected increase in the revenue under Part I.

"We will now discuss the three parts of the Forecast, as follows —

"*Part I.* — The revenue for 1929 was \$279,636.42. The appropriation for 1930 was \$298,950. The appropriation bears about the same relation to the revenue as was true of the appropriation for 1929 compared to the revenue for 1928, although there was an increase of \$30,000 in the revenue of 1929 over that of 1928. We have indicated above that the revenue for this year will be about the same as for 1929, and therefore the appropriation for 1931 may be about the same as this year unless consideration is given to the propositions stated hereafter.

"*Part II.* — Where no revenue is anticipated we assume the appropriation for 1931 may be the same as this year, unless the appropriating powers are impressed with what follows.

"*Part III.* — While we have estimated a decrease in the marine fisheries revenue for 1930 of about 17 per cent under the revenue of 1929, and indicate no increase in 1931 over 1930, we do not believe it necessary to advance any arguments in favor of maintaining the ratio of appropriation to revenue in this part. The government now seems committed to the policy of substantially recognizing the needs of the commercial fisheries industry. We sincerely hope that there will be no downward revision in the appropriation.

"On the broad proposition as to what should be the policy of the government in making an appropriation to cover Parts I and II of this Division's work (which finances the administration of *all* our wild life except the marine fisheries), we submit —

"The appropriation (with the exception of the small annual appropriation of several years of \$3,700 to cover Part II) is based almost entirely on the revenue from sporting licenses. The revenue from fines annually collected by the inland warden force, and from miscellaneous income, is so small in relation to the total amount, as not to be a factor. Moreover, it should not be the desire of any of us to capitalize the penalties imposed on our citizens for violation of the inland fish and game laws.

"From this analysis it appears that the group of our citizens collectively known as the sportsmen, which purchases sporting licenses, is financing practically all of the expense of administering *all* the wild life of our State — except the marine fisheries.

"But this group is primarily interested in that portion of our wild life which is classed as game, and includes our fresh water fish, game birds and game quadrupeds. We estimate that not more than 40 per cent of all the wild life should be classed as game. The remaining 60 per cent is made up of our song, insectivorous and non-game birds and non-game quadrupeds. The group classed as sportsmen is no more interested in the preservation and increase in this 60 per cent of our wild life than are the million and a half of our people who enjoy the outdoors and the presence of this wild life, but do not hunt or fish.

"The inland warden force (all of the cost of which is annually included in Part I of our Forecast) is as energetic in enforcing the laws to protect the 60 per cent of our wild life not classed as game, as it is to protect the 40 per cent classed as game.



The pheasants and bob whites annually distributed from the game farms bring great interest to the non-hunting public, although the entire cost of producing them is charged to Part I. The cost of acquiring properties for game farm and fish hatchery purposes is all charged to Part I, although these areas are maintained as inviolate sanctuaries upon which the nature-loving part of our people is welcome to observe the wild life thereon. Other instances could be given of the extent to which the general nature-loving public is today benefited by the expenditure of the appropriation under Part I, although the sportsmen supply all the revenue on which that appropriation is based.

"For the foregoing reasons we submit that the appropriation covering Part I of our activities, should annually be very substantially increased over the revenue from sporting licenses and miscellaneous income of the previous year. Some small percentage of the general taxes paid by the sportsmen should be added to this revenue, as well as a portion of the general taxes paid by the million and a half of our people who enjoy the wild life but who do not hunt or fish.

"The foregoing arguments apply with equal force to the financing of 'Part II — Administration of Wild Life not classed as Game, including Sanctuaries.' A number of valuable tracts of land have been given to the Commonwealth to be wild life sanctuaries. Some are being gradually enlarged by additional gifts. The development of these would encourage further contributions of land and money from public-spirited people. Sufficient appropriation should be made out of the general taxes paid by our nature-loving people, to meet the present requirements.

"The surest guarantee of maintaining a permanent wild life stock is the presence of a chain of sanctuaries scattered across a given State. These should be of sufficient size to justify the maintenance of a superintendent throughout the year. He would exclude poachers, keep up a constant war on vermin, work over the territory to make it attractive to the largest number of desirable species of wild life, and carry on some artificial propagation.

"The considerations which would govern the purchase of an area for a wild life sanctuary are entirely different from those controlling the purchase of lands for State forests. Massachusetts is a small state of approximately 8,200 square miles of lands and inland waters, with a population of approximately four and a quarter million. A greater need of wild life sanctuaries exists in such a State than others less densely populated. Up to the present the government has not appropriated funds sufficient to purchase one such sanctuary, to say nothing of the establishment of a chain of them. We believe the establishment of one such sanctuary would meet with such public approval that the government would be encouraged to go further.

"I shall not attempt to suggest an allocation of the 1931 appropriation, except to say that an increase in the appropriation for Part I, if made, should be divided largely between Item 273 (which is Propagation) and Item 275 (which is Specials). The appropriations of recent years have been insufficient to permit the operation of our game farms and fish hatcheries at their maximum capacity, to keep our salvage crews fully employed in such work, and to make possible the purchase of stock to supplement our annual output.

"None of our game farms and fish hatcheries is fully developed. We are carrying under lease, with options of purchase, tracts of land aggregating \$7,635, which should be taken over. Additional tracts should be acquired to protect our watersheds and to supply the necessary areas for our game farms. Fish rearing stations should be established in Berkshire and Essex counties when suitable sites have been located. Public fishing grounds should be provided. Practically all of our trout fishing is to be found in our non-navigable streams. The riparian owners have complete control of the fishing in such streams. Steps should be taken to lease the fishing rights on most of our principal streams, with provisions in the leases by which options will be acquired on sufficient strips of land to make possible the purchase of such lands, thereby establishing public fishing grounds for all time. The sites of many former privately owned reservoirs, now abandoned, should be purchased, the dams restored, and the areas flooded to provide additional public fishing grounds.

"A survey should be made of the pollution of our waters. At the present time we have no records of what is taking place and no funds to make a careful study of this important matter.

"Under Part II should be included the salary and operating expenses of the Supervisor of Fish and Game Permits and Claims, for his activities lie largely in this field. It is here the appropriation should be made for the establishment of one or more wild life sanctuaries of the type described above.

"You have made such study of the needs of the marine fisheries and played such an important part in the establishment of a marine fisheries section within the Division, that we feel certain you will sense out the requirements of the section and recommend sufficient appropriation to adequately finance it.

Very truly yours,

WILLIAM C. ADAMS, *Director.*"

# APPROPRIATIONS AND EXPENDITURES, 1930

Budget Item	Appropriations	Expenditures	Balances
<b>Part I (Revenue for 1929, \$279,636.42)</b>			
265 Salary of the Director . . . . .	\$4,250.00	\$4,250.00	—
266 Office Assistants, Personal Services . . . . .	10,800.00	10,794.82	\$5.18
267 Office Expenses . . . . .	8,000.00	7,965.59	34.41
268 Education and Publicity . . . . .	1,000.00	997.88	2.12
Enforcement of Laws:			
269 Personal Services . . . . .	69,000.00	68,259.64	740.36 <sup>1</sup>
270 Expenses . . . . .	38,200.00	37,565.71	634.29 <sup>2</sup>
Biologist:			
271 Personal Services . . . . .	7,200.00	7,198.33	1.67
272 Expenses . . . . .	2,500.00	2,497.47	2.53
273 Propagation of Game Birds, etc. . . . .	115,000.00	116,394.32	105.68
Propagation of Game Birds, etc. (from Governor's Fund for Extraordinary Expenses) . . . . .	1,500.00		
274 Damages by Wild Deer and Wild Moose . . . . .	13,000.00	4,908.04	8,091.96
275 Improvements and Additions at Fish Hatcheries and Game Farms . . . . .	30,000.00	29,054.39	945.61 <sup>1</sup>
<b>Part II (Revenue for 1929, Nothing)</b>			
276 Protection of Wild Life . . . . .	3,700.00	3,697.78	2.22
<b>Part III (Revenue for 1929, \$11,490.90)</b>			
277 Marine Fisheries, Sale and Cold Storage of Fresh Food Fish . . . . .	15,000.00	14,890.67	109.33
State Supervisor of Marine Fisheries:			
278 Personal Services . . . . .	9,000.00	6,454.49	2,545.51 <sup>4</sup>
279 Expenses . . . . .	5,000.00	2,975.65	2,024.35 <sup>5</sup>
Enforcement of Shellfish Laws:			
280 Personal Services . . . . .	15,000.00	14,860.70	139.30
281 Expenses . . . . .	9,500.00	8,975.74	524.26 <sup>5</sup>
282 Purchase of Lobsters . . . . .	10,000.00	10,016.22	—
Transfer from Small Items Appropriation (a general State fund) . . . . .	16.22		
275a Construction of Fishways on Parker River . . . . .	7,500.00	6,718.87	781.13 <sup>1</sup>
283 Bounty on Seals . . . . .	800.00	660.00	140.00
	\$375,966.22	\$359,136.31	\$16,829.91
Less amounts available for use in 1931 . . . . .	—	—	1,726.74 <sup>2</sup>
Amount actually returned to Treasury . . . . .	—	—	\$15,103.17
<b>Balance available from 1929 appropriation for Improvements and Additions at Fish Hatcheries and Game Farms, expended in 1930 . . . . .</b>			
	\$1,229.50	\$1,229.50	—

<sup>1</sup> Available for use in 1931.

<sup>2</sup> This balance is due to rearrangement in the law enforcement personnel, namely, the retirement of a warden and the appointment of a new one at a lower salary to replace him; and the transfer of the Chief Warden to a newly created position, whose replacement was at a lower figure.

<sup>3</sup> This balance was held to meet any possible emergency in the operation of 34 automobiles.

<sup>4</sup> This balance is due to the fact that after deciding to combine the work of the biologist and statistician into one position, it was not until October 1 that a man was found for the position.

<sup>5</sup> The reserve for travelling expenses to cover the Supervisor and the Biologist were not entirely used, owing to the Supervisor being confined more closely to the office than anticipated, and because the Biologist was not appointed until late in the fiscal year. This balance will be reduced by the payment of an outstanding bill for printing shellfish reports, which will amount to from \$1,000 to \$1,200.

<sup>6</sup> The balance was held to cover emergencies in the operation of ten automobiles.

REVENUE

The revenue turned into the State Treasury for the period of the fiscal year (divided into three parts corresponding to the three parts of the Forecast), was:

	Part I Produced by the Hunters, Anglers and Trappers	Part II Produced by those who en- joy Wild Life but do not Hunt, Fish or Trap	Part III Produced by the Marine Fisheries
<b>Part I</b>			
Sporting and trapping license fees . . . . .	\$269,624. 00		
Rent, sales, etc., at stations . . . . .	303. 00		
Sale of shiner permits . . . . .	425. 00		
Sale of game tags . . . . .	93. 55		
Sale of confiscated goods . . . . .	55. 90		
Sale of miscellaneous goods . . . . .	40. 00		
Fines turned into the State Treasury as a result of fish and game law violations . . . . .	13,327. 00		
Gunning stand permits . . . . .	767. 25		
<b>Part II</b>			
Nothing . . . . .		Nothing	
<b>Part III</b>			
Lobster license fees . . . . .			\$5,373. 80
Sale of lobster meat permits . . . . .			340. 00
Sale of lobster rules . . . . .			9. 50
Lease of clam flats . . . . .			25. 00
Lease of Chilmark Pond . . . . .			75. 00
Fines turned into the State Treasury as a result of fish and game law violations . . . . .			2,826. 00
Total revenue \$293,285 . . . . .	\$284,635. 70	Nothing	\$8,649. 30

DETAIL OF RECEIPTS FROM SPORTING, TRAPPING AND LOBSTER LICENSES

KIND	Total Number Issued	Gross Value	Fees to Clerks	Net Return to State
Resident Sporting (\$2.25) . . . . .	118,861	\$267,437. 25	\$29,715. 25	\$237,722. 00
Resident Trapping (\$2.25) . . . . .	4,170	9,382. 50	1,042. 50	8,340. 00
Non-resident Sporting (\$5.25) . . . . .	2,626	13,786. 50	656. 50	13,130. 00
Non-resident Trapping (\$5.25) . . . . .	42	220. 50	10. 50	210. 00
Non-resident Sporting (\$2.25) . . . . .	623	1,401. 75	155. 75	1,246. 00
Non-resident Trapping (\$2.25) . . . . .	17	38. 25	4. 25	34. 00
Alien Sporting (\$15.25) . . . . .	336	5,124. 00	84. 00	5,040. 00
Alien Trapping (\$15.25) . . . . .	11	167. 75	2. 75	165. 00
Minor Trapping (\$0.75) . . . . .	5,961	4,470. 75	1,490. 25	2,980. 50
Duplicate Licenses (\$0.50) . . . . .	1,513	756. 50	-	756. 50
	134,160	\$302,785. 75	\$33,161. 75	\$269,624. 00
Lobster (\$5.00) . . . . .	1,108	\$5,540. 00	\$166. 20	\$5,373. 80

ACTIVITIES OUTSIDE THE STATE

The Director attended meetings having to do with all phases of wild life conservation, as follows:

The annual meeting on December 2 and 3, 1929, in New York City, of the National Game Conference, under the auspices of the American Game Protective Association. At this meeting he read a paper entitled, "The American System of Free Shooting and Fishing."

The annual meeting on December 5, 1929, in Washington, D. C., of the Advisory Board to the Secretary of Agriculture relative to regulations proposed by the Bureau of Biological Survey affecting wild fowl — of which board the Director is a member.



The Supervisor of Marine Fisheries attended the annual conference of the National Association of Shellfish Commissioners and of the Oyster Growers and Dealers Association of North America, Inc., at Sayville, Long Island, N. Y., August 19-21.

The Director and the Inspector of Fish attended the joint meeting of the United States Shellfisheries Association and the Canadian Fisheries Association in Montreal September 11-14.

#### CONFERENCES WITHIN THE STATE

The annual conference with the anglers, hunters and trappers and those interested generally in wild life, which is usually held in the latter part of December or in January, was dispensed with, for the reason that the special commission to revise the game and inland fish laws had held, immediately prior to the beginning of the year, a number of conferences in various parts of the State. The Division was represented on this commission, and a stenographic record was made of the hearings. These records were inspected by the Director. It was felt that the calling of a national conference would be, in a large measure, a duplication, and would be asking the sportsmen to go to considerable expense and loss of time to cover largely the same field of discussion.

In June the Director, along with the fish and game commissioners of the other New England states, attended the conference called by the officers of the New England Council. The purpose was to consider the advisability of setting up a permanent committee within the Council to deal with the wild life resources of New England. Later the Director sent a communication to the Council suggesting a form of reorganization and outlining the work that such permanent committee might carry on.

The Director also attended a conference on November 12, called by the Massachusetts Forestry Association, to consider "A Topographic Re-survey and a Land Economic Survey for Massachusetts." He later filed with the Association a brief in favor of such action.

Following his usual practice the Director attended a large number of meetings of local fish and game clubs and chapters of the Izaak Walton League, and meetings of the Massachusetts Council of Sportsmen's Clubs.

#### ACTIVITIES OF LOCAL AND STATE ORGANIZATIONS

It is a great satisfaction to note the extent to which the local and State organizations are reaching out into new fields.

During the past year a larger number of local clubs and chapters of the Izaak Walton League than ever before built and operated rearing pools for fish or took pheasants to be carried through the winter. One or two clubs have also established small pond cultural units for the rearing of pond fish. Likewise, a larger number of individuals and clubs took most of the three months old pheasants produced at our game farms for wintering, the pens and the labor being supplied independent of divisional funds.

In connection with both the fish and game rearing activities of these individuals and clubs, we realize the importance of supervision and advice by an experienced member of this division. To this end, Superintendent Arthur Merrill of the Sutton Fish Rearing Station has been used, for he stands unique in that he is at once an experienced fish culturist and a bird culturist. During the year Superintendent Merrill made 91 special trips for these purposes to different points in the State, and for making special field investigations, involving 183 projects and occupying over 171 hours.

Although no direct appeal was made, some clubs made contributions of cash for the work of the Division. If all the accomplishments of such organizations were listed separately it would make an imposing array. Mention should also be made of individuals who are helping more and more among similar lines.

Each year sees an increase in the number of such local organizations. We now have 225 local clubs and chapters of the Izaak Walton League. The local clubs

are rapidly forming county leagues, which serve as clearing houses for the problems of local organizations within the respective counties. This is a highly desirable arrangement, for the reason that the several counties, by reason of their location, often have separate local problems as distinguished from those of State-wide scope.

During the year the county leagues have selected a delegate and an alternate to represent their respective counties in a Council of Sportsmen's Clubs of Massachusetts. As soon as all the county leagues have been formed and the member and alternate selected, the Council will serve as the contact point between the Division and the sportsmen at large. We continue to believe that this is a more desirable form of organization than any which could be set up through legislation. Being voluntary in its nature and entirely outside of the Division, it is in the most independent position to render service. The Massachusetts Fish and Game Association has for some years been in the nature of a substitute for the Council, and has rendered valuable service. Particular mention should be made of the initiative taken by it in bringing about a revision of the inland fish and game laws at the last legislative session.

The State Division of the Izaak Walton League has, during the year, effected a reorganization and is now actively engaged in enlarging its field of usefulness.

It is a temptation to enumerate the special contributions in legislative and publicity fields made by various members of the local organizations. We take this opportunity to acknowledge this growing interest in the work.

#### ACKNOWLEDGMENTS

Additional gifts and the disposition of balances of previous gifts, are reported as follows:

##### *The Merrill Ponds System Fund*

The Merrill Ponds System Fund is the name recently given to what was formerly known as the Stockwell Ponds Fund, as part of our plan to more definitely fix the titles of our plants.

The balance of \$199.25, reported at the close of the preceding year, was increased by a contribution of \$100 from the Westborough Fish and Game Association. The entire amount (except 25¢ now on hand) was devoted to spring and fall work on the dam at the Thompson Pond in advancing the stone work and fill.

##### *Amherst Fish Hatchery Fund*

In the last report we recorded \$300 held for the purchase of land, and a balance of \$38.25. The \$300 was used for the purchase, from George Hubbard, of a hatchet-shaped tract which will enable us to widen and improve the road into the hatchery grounds, and extends the property for a distance back of the garage and meat house. The \$38.25 remains unexpended.

During the year a joint contribution of \$269 was made by the Paper City Rod and Gun Club of Holyoke, the Holyoke Chapter of the Izaak Walton League, and the Holyoke Fish and Game Association. This amount also remains unexpended, and makes a total of \$307.25 on hand at the close of the year.

##### *Montague Fish Hatchery Fund*

The balance of \$25 on hand at the close of the last fiscal year is still unexpended.

##### *Gifts of Land*

The New England Power Construction Company deeded 38 acres of land to the Commonwealth, to be used as a wild life sanctuary on which game birds may be reared. This land lies beside the town road from the Ayer Game Farm property, and is admirably adapted for the uses of the farm. The deed was made subject to cutting rights, and the purchaser of the timber is now removing it from the location.



### *Other Gifts*

The balance of \$38.42 remaining on hand at the close of last year from the fund raised in 1927 by the North Shore Rod and Gun Club (including contributions from Ralph S. Bauer, Esq., of Lynn and from the Massachusetts Fish and Game Association) to pay for salvaging fish from Wenham Lake, was expended for that purpose this year.

The balance of \$50 from Isaac Sprague for further development of Carr Island, brought over from last year, is still on hand.

During the fiscal year 1930 the following gifts were received:

S. W. Carey, Jr. (for purchase of ruffed grouse and quail), \$349.03. Of this amount \$248.12 was expended in the purchase of 21 ruffed grouse which were liberated on Martha's Vineyard, and \$100 for the purchase of 20 quail, which were liberated on Nantucket, leaving a balance of 91¢, which is still on hand.

Watcha Club (for the opening of Oyster Pond, \$15. This amount remains on hand, against future openings of the pond.

Dighton Fish and Game Club (for the general work of the Division), \$100. This is still unexpended.

The town of Falmouth again voted the sum of \$100 for paying expenses of the transfer of fish, by one of our salvage units, from Long Pond, Falmouth, to local waters open to public fishing. Beginning with 1927 the town of Falmouth has each year made this appropriation for fish salvage. In our 1929 report, acknowledgment of the contribution for that year was inadvertently omitted. We take this opportunity to rectify the oversight.

The Town of Webster following a custom of several years, appropriated \$200 for stocking local waters with fish, paying the bills for the work.

### **ENFORCEMENT OF LAWS**

Several changes will be noted in the personnel of the law enforcement unit during the year, some of which are far reaching in character.

As already noted, on June 1, Orrin C. Bourne, who had served as Chief Warden since 1912, was transferred to a newly created position as Supervisor of Fish and Game Permits and Claims.

On that date, Raymond J. Kenney, who had served as Deputy Chief Warden since 1921, was advanced to the position of Chief Warden, assuming the responsibility of enforcing the fish and game laws throughout the State and directing the warden and deputy warden force.

At the same time Warden Carl G. Bates, of Warren, who had served since 1926, was promoted to the position of Field Supervisor. Supervisor Bates will operate from headquarters at Worcester. He will carry out the law enforcement policies in the field through the direct supervision of the activities of the warden force. Warden Fred W. Goodwin, who was Acting Field Supervisor for a period of time, was returned to his former assignment as a district warden.

On April 7 Warden William W. Sargood of Lee was retired from the service because of disability received in line of duty. Mr. Sargood had served in the Division for a period of twenty years, and the injury which resulted in his retirement occurred a few months previous to the time when he would have automatically left the service through the operation of the maximum age limit. Warden Sargood had gained the respect of the residents of Southern Berkshire County because of the tact he had used in the performance of his work.

Two additions were made to the warden force by reason of the above arrangement, namely John T. Whyte of Framingham appointed on October 1 as a permanent warden and assigned to the Warren district to take over the work formerly handled by Supervisor Bates. Warden W. Leary of Hudson was appointed to the force on November 8 and assigned to the Southern Berkshire District, which was the area patrolled by former Warden Sargood.

Warden Henry M. Parlee, who had been in charge of the Boston district during Warden Goodwin's temporary absence from patrol work, has been assigned to



work at large on special assignments in cooperation with the various district wardens.

The court work for the year was as follows: Number of cases, 1,482; convicted, 1,407; discharged, 75 (filed, 274, appealed 37); fines imposed, 15,711. In addition to the penalty imposed by the courts, each person convicted loses any sporting license or trapping license which may have been issued to him, together with his right to secure a license within one year following date of conviction. Licenses revoked: resident citizen sporting, 373; non-resident sporting, 8; resident trapping, 28; alien sporting, 6; minor trapping, 6; total, 421.

In making a survey of the court records it is again noted that as far as the number of cases is concerned the charge of "fishing without a license" leads all others with 452 cases, indicating the laxity of the public in obtaining a sporting license before engaging in fishing activities. At the present time there is less excuse for this violation than at any previous time, due to the fact that a sporting license is now required in every inland water of the Commonwealth and every effort has been made to give general publicity to that fact.

The records show that 36 cases were entered against aliens who were found to be in the unlawful possession of firearms, and in each case a substantial penalty was imposed and the firearms confiscated.

The warden force has been extremely active as heretofore in the detection and prosecution of violations of the laws protecting song and insectivorous birds, and during the year 51 cases were presented to the courts. The outstanding case was the arrest in Williamstown on October 26 of Antoni Fachini of North Adams, who, by the use of a large net, had taken thirty-one song and insectivorous birds. A fine of one hundred and fifty dollars was imposed on him, while his companion, Silvio Pieropan of North Adams, was fined fifty dollars.

During the forest fire crisis in May, which required the suspension of the fishing season and closing of the woods by proclamation of the Governor, the warden force was extremely active in the enforcement of the Governor's proclamation and the prosecution of persons who entered the woodlands or otherwise violated the law. During that period 96 cases were brought before the courts.

The action of the Legislature in repealing the protective laws on sunfish, blue gills and other pond fishes removed many cases from the consideration of the courts as there is now no protection afforded to these common varieties of pond fish.

The warden force has been confronted with a difficult situation, particularly through the central section of the State, with respect to the illegal killing of wood ducks. These birds are now found in large numbers along some of the inland water courses, and during the early part of the open season on water-fowl a number of the wood ducks had been illegally killed, resulting in several prosecutions and convictions. While in some instances the killing is accidental, yet in most cases the wardens have found that the hunters have deliberately shot at all species of ducks without making any effort to determine whether or not wood ducks were among those on flight.

The year just closing marks a step in the equipment of the warden force in view of the fact that all wardens now have closed cars, giving them reasonable protection against the elements which previously they were compelled to withstand due to their constant patrol in all seasons and in all weather.

During the year the warden force was assisted by a large number of volunteer deputies and by wardens appointed in various cities and towns throughout the State. Some of these men have rendered very creditable service and the Division is indebted for the value of their service.

#### NEW LEGISLATION

The Legislature of 1930 enacted a complete revision of the inland fish and game laws. This revision was based on the report of the special commission authorized by the previous Legislature, which made a comprehensive study and survey of the laws and recommended many substantial changes.

It would be impossible to make a detailed statement herein covering all of the changes, but a few of the more important are worthy of note.

To meet the increasing needs of the Division, the Commission determined that there be an increase in the revenue from sporting and trapping licenses and accordingly increased the cost of a resident sporting license from \$2.25 to \$2.75 and of a resident trapping license from \$2.25 to \$5.25. The non-resident sporting and trapping licenses were advanced from \$5.25 to \$10.25 but provisions were made whereby non-residents may obtain a special license entitling them to fish only at a cost of \$3.25. Another notable change in the license section of the laws was an exemption granted to citizens of the Commonwealth who had reached the age of seventy, who in the future will obtain a sporting license free of cost, and a further change was made whereby minors under the age of fifteen can no longer obtain a trapping license.

Provision was made for the establishment of public fishing grounds by the Director if and when money is appropriated to accomplish that purpose.

Heretofore a sporting license has been required only for fishing in the inland stocked waters, but under the terms of the revised laws a sporting license is now required for every inland water whether stocked or otherwise.

The Legislature grants the Director the privilege of issuing sporting and trapping licenses from the central office at the State House to supplement the established policy of issuing these licenses by the town and city clerks.

For the first time hunters, as well as trappers, are required to make a written report at the end of the year of the number of birds and mammals taken by them. When this new law becomes operative it should afford valuable statistics which will aid in a businesslike administration of the wild life of the Commonwealth.

A general downward revision was made of the bag limits on fish as it was felt that the previous bag limits resulted in too heavy a drain on the fish supply of the State.

Probably the most far-reaching change made in the laws relating to hunting was a provision requiring all permanent gunning stands and blinds to be registered with the Division at a fee of \$2.75, thus placing upon the person who registered such a stand the responsibility for the observance of the law by all persons who gun there.

All laws relative to migratory birds were repealed and the Director was given authority to regulate the taking of such species within the State, with the provision that such regulations should at all times conform with Federal rules and regulations.

Further restriction was placed upon the hunting of migratory birds by means of a law which prohibits the use of grain upon any land or water within the Commonwealth for baiting wild birds for the purpose of hunting. While this law covers all species of wild birds, it will react most particularly against the use of grain for the taking of migratory water-fowl, and is intended as a further conservation measure.

The discharge of firearms on State highways or within fifty yards thereof has also been prohibited. This section applies only to highways constructed and maintained by the State and is intended more as a matter of public safety than of conservation.

It is now lawful to train hunting dogs between September 1 and the following April 1, provided no firearms are carried by the person training dogs except during the regular hunting season.

Another far-reaching change included in the revision of the law permits the possession of fish and game lawfully taken or lawfully imported from another State. Heretofore such fish or game could be possessed only for a short period of time after the close of the hunting or fishing season, but this restriction is now removed with the exception of the case of migratory birds, which naturally come within the scope of the Federal regulations. In a like manner provision was made for the exportation from the State by non-residents of all fish and game lawfully taken by them during the hunting or fishing season.

While the foregoing outlines some of the major changes brought about through



the revision, it does not fully indicate the importance of the work, as the laws were enacted in a form much more readily understood by both the public and by the officers who are charged with the enforcement of them.

At the State election on November 4 the voters of the Commonwealth enacted into law an initiative petition relative to the types of traps which may be used for trapping in this State. The intention of the law is to prohibit the use of all traps which do not kill any animal or take it alive and unhurt, but an exemption is granted allowing the use of any trap, which otherwise conforms with law, within fifty yards of any building or cultivated plot of land. At this writing it is impossible to foresee the effect of this law on the trapping industry of the State or upon the conservation of wild life.

### RECOMMENDATIONS FOR LEGISLATION

The Division will not recommend any far-reaching changes in the revised laws to the Legislature of 1931. While a few recommendations will be transmitted to the Legislature they will be in the nature of desirable perfecting amendments, or to correct oversights in the enactment of the revised laws.

### EDUCATION AND PUBLICITY

Through releases to the press and special articles, we continue to keep the public informed of the work in general.

The Director and the Supervisor of Fish and Game Permits and Claims have given a number of illustrated lectures throughout the State — for details of which see the account of the work of the Supervisor later in this report.

The exhibit at the Eastern States Exposition in West Springfield was not put on this year, as the Division surrendered its space to the Department of Agriculture for the use of the State Grange.

The Division supplied an exhibit for the Exposition of Massachusetts Governmental Activities at the Commonwealth Armory, in connection with the Massachusetts Tercentenary celebration.

Assistance was also rendered in putting on exhibits at the Franklin County Agricultural Society's fair at Greenfield, at the Fair of the Worcester Agricultural Society at Worcester, and at the Three County Fair at Northampton.

### BIOLOGICAL SECTION

#### GENERAL

The biologist and his staff, as rapidly as the general work will permit, is continuing the building up of the records of our inland waters. There is a surprising lack of data in the State departments on some of our privately owned as well as State-owned inland waters. The information collected from month to month from all available sources is systematically classified under each separate body of water.

Maps have been prepared, locating our inland streams, and the work of classifying the streams with respect to their suitability for stocking, involving the physical proportions and volume of water flow, is being slowly advanced.

#### FIELD WORK

The usual number of inquiries on miscellaneous biological subjects was handled, including the autopsy of specimens sent in by the general public.

Further data were added to our records of the pond rearing units established by various local fish and game clubs, and through the assistance of Superintendent Merrill, these units were checked up. There were numerous complications, and some trouble due to the extraordinary drought conditions, necessitating more assistance than would be the case in a normal year.



The general low water throughout the State resulted in numerous complaints of fish being stranded, which were given prompt attention. Several cases were investigated of fish dying in ponds, but nothing more than the usual conditions was discovered. It is interesting to note the annual mortality of fish in several ponds, for reasons which as yet remain unexplained. This loss does not occur annually in any given pond, but seems more or less scattered over the State, and usually in different waters each year.

The work of the salvage crews was laid out, permission to operate in certain closed waters obtained, and arrangements were made for the planting of the fish taken.

Periodic visits were made as usual to all the fish hatcheries and game farms.

#### DISTRIBUTION

Owing to the lack of funds the fish and game distribution committees of the local fish and game clubs continue to be the principal agencies through which the annual distribution of hatchery and game farm outputs, salvaged fish, trapped cottontails, and purchased stock such as white hares, are distributed. While it would be more desirable to make these distributions entirely through State agents, we must, in all fairness, compliment the local organizations for the splendid, intelligent service they annually render. In many cases they supply the trucks to call at the hatcheries and game farms for their allotments. In the main, painstaking efforts are put forth by the distribution committees to see that the stock is properly handled and planted, in the right kind of waters and covers.

The public generally has little idea of the amount of detail involved in this one phase of our work. All of the fish, game birds and quadrupeds liberated have a definite market value, and therefore, when a shipment of stock is made, it is equivalent to turning over to the individual or club, so much cash. For this reason the records of each transaction are carefully kept. The making up of the distribution lists for the game farms and fish hatcheries, the notices to the distributing committees, the checking up and getting back into this office of receipts which must be signed for all stock, with final note on each item, consumes a large portion of the time of the biologist and his force each year.

The revision of the inland fish and game laws, which went into effect in August, provided that a sporting license is required to fish *all* inland waters of the Commonwealth, thereby doing away with the necessity of compiling the list of inland waters legally stocked by the Division each year.

Special attention continues to be given to the ponds stocked with small mouth bass, for it seems desirable to limit the planting of these fish to waters which are today known to contain bass. The annual stocking of a selected group of ponds with white perch was continued.

In view of the fact that the owners of private inland waters may post the same and exclude the public, we have continued to be on the lookout for those cases whereby we may enter into a special agreement with the owners that the water will remain open as a result of being stocked by the Division.

#### FISH AND BIRD DISEASES

We continue under obligation to Dr. E. E. Tyzzer of the Harvard Medical School and his assistant, Dr. Hans Theiler, for the assistance rendered to the Division in the making of biological examinations of specimens of fish, birds and quadrupeds forwarded to them from time to time.

We also acknowledge assistance from the United States Bureau of Fisheries in connection with diseases at the fish hatcheries. All of these matters are touched on under the reports of the stations affected.

#### SUPERVISOR OF FISH AND GAME PERMITS AND CLAIMS SECTION

A new position, under the above title, was established on June 1 of this year, brief mention of which has been made elsewhere. The position covers handling of claims against the Commonwealth for deer damage; issuance of special permits

(other than those relating to marine fisheries); supervision of wild life sanctuaries; investigation of the need of closing open seasons on any species of fish or game by reason of adverse conditions; purchase of equipment; and to the supervisor falls also most of the lecture work of the Division (outside of the substantial amount done by the Director personally); all exhibitions; and various miscellaneous duties.

To this position was appointed Orrin C. Bourne, formerly Chief Warden in this Division. The report of work in his new capacity follows. Although he did not take office until June 1, the report covers the work of the entire fiscal year, for the reason that he had been performing the duties of the position for some time previous to his actual appointment.

Deer damage claims have run as high, in certain years past, as ten or even fifteen thousand dollars. Anticipating an increase in these claims, \$13,000 was allowed in the budget, but up to the close of the fiscal year the actual payments have been much below this figure, being \$4,908.04 on 121 claims. (Full details are given in the section on "Birds and Animals — Upland Game, Deer.") The damage in all cases is carefully investigated and appraised before payment is made, and this, coupled to the effect of the two weeks of open season on deer, which has had the effect of sending into the deep woods the deer that used to winter near farms and orchards, has undoubtedly helped in keeping the damages paid at this low figure.

Claims of an unusual nature are frequently received, and some of the odd ones this year were for eating the buds from fancy aster plants; many claims for fruit on low-headed apple trees; fancy turnips; and the injury to new cranberry bog vines. This last claim on examination showed damage not done by deer. This and a few others were not approved.

During the past year considerable study has been made on the possible tagging of fruit trees on which deer damage claims have been paid, and certain experimental tagging has been done. We make use of the appraisal system worked out by the Massachusetts Fruit Growers' Association in conjunction with officers at the Massachusetts Agricultural College, which we adopted. This is a percentage basis for small fruit trees, using 20 per cent to represent the value of leader and each scaffold branch and 100 per cent to represent total loss. Each of our 14 appraising wardens have been supplied with brass tags marked "Mass." and varying percentages. All 100 per cent damaged trees may now be removed. To all lesser damaged trees are attached the tags fastened by copper wire bearing the percentage of loss, and a lead seal closing the ends of the wires with a die stamp which leaves the first two letters in our warden appraiser's name and the year of attachment. All later claims against these trees show the amount paid on each individual tree so that any future claims will not include damages already paid.

The investigation of applications for permits, and their issuance, consumes a substantial amount of time. Permits are required for the possession of any of our protected wild animals or birds during closed seasons. Hundreds of requests are received each year, and a variety of reasons given for desiring to hold some wild creature. Many are from persons who have found injured birds or animals unable to care for themselves, and since unauthorized possession constitutes a violation of the law, they must secure a permit. These we are glad to issue. It is stipulated that all these creatures be liberated as soon as they are able to take care of themselves. The greatest number of requests come from persons who happen to find an immature creature that cannot escape them, and the claim usually is made that these have been deserted by the parents, and that the person wants to possess them for pets or breeding purposes. Most of these creatures have not been deserted and will be perfectly all right if left alone. Few survive in captivity and it is much better to leave them unmolested. We must continue to warn against securing possession in this way. Permits are not to be given in these cases.

There are also museums, scientific collectors, taxidermists, as well as dealers in propagated wild game and fur-bearing animals, that require investigation and the issuance of permits for possession and importation. To be sure that such permits are placed in the hands of proper persons, a blank is forwarded to the applicant to show his need and the source of his supply. Our warden is notified



to interview each individual or view the proposed location, and, as the case may be, certifies to the reliability of the person applying, and suitability of its location if for breeding. If birds and animals are to be imported from other states or countries for breeding or liberation, a permit is now required. For the safety of our own wild life, a check must be put on the importation of any sick, diseased, or detrimental creatures.

A provision in the revision of the inland fish and game laws which went into effect this year, required the licensing of all permanent gunning stands. Application forms and licenses have been prepared, and 288 permits issued at \$2.75 each to parties who are using live duck and goose decoys in the taking of wild fowl.

Eighty-seven permits at \$5 each were issued for taking shiners for bait.

There are 1,607 permits in force (good until revoked) authorizing the possession of game birds and animals for purposes of propagation.

Eighty-nine permits (good until revoked) are in force for taking protected birds, their nests and eggs. An annual report of birds and eggs taken is, however, required. Eighty-four such reports were received, reporting the taking of 145 protected birds and 591 eggs of protected species.

One hundred and eleven permits to band birds were issued.

For the work of the Supervisor on reservations, see the section in this report on "Birds and Animals — Other Sanctuaries."

Evening talks accompanied by stereopticon slides, were given on twenty-three occasions, between January and May, and several engagements were covered during the fall. The reason for the small number of these, during the past year, is the fact that the Director personally appeared before most of the co-operating fish and game clubs last winter. The other principal requests for talks coming to this branch were from men's clubs, churches, Rotary clubs, and fraternal societies. The work of the inland section of the Division was quite thoroughly explained by use of colored lantern slides, which helped to visualize the areas mentioned in the talks, and to show details of the hatchery work. Moving pictures would be very desirable, but none can be made until the proper equipment and travelling outfit is at hand to display them on a tour of all sections of the State. A recent addition to the equipment is an automatic balopticon, showing the work of the Division, which may be set in a convenient place and continually show pictures. This was used quite extensively before Y. M. C. A.'s, and proved very popular.

Photographs are being made, whenever opportunity offers, of new work at the game farms and fish hatcheries. Those which bring out some special point are made into colored slides, and all are filed in books (classified by subject) for historical record.

The usual exhibit at the Eastern States Exposition at West Springfield was not made, our space having been relinquished to the State Grange.

In connection with the Exposition of Massachusetts Governmental Activities at the Commonwealth Armory in connection with the Massachusetts Tercentenary Celebration, a pen of live quail and one of pheasants were displayed, together with trout and adult pond fish in glass aquaria. The water flowed into a 12 x 27 foot canvas pond, in which a large number of warm water food and sporting fish of various kinds were moving about. A marine table displayed shellfish, egg-bearing lobsters, crabs, and sea novelties such as razor clams, starfish, and horseshoe crabs. At the close of the exhibition several days were spent salvaging lumber for use at the hatcheries, this being principally the flooring used in the booths of various departmental exhibitions.

Some of the fish and game clubs displayed at the county fairs trout and pheasants which were included in their quotas for distribution.

The supervisor, as one of his miscellaneous duties, arranged and personally conducted several trips to the fish hatcheries and game farms, so that a portion of the office staff might become familiar with the work of producing birds and fish, concerning which they were constantly writing or making records. Previously, the terms used in the daily work conveyed but little to them, whereas now they can easily visualize our many activities.

In the course of the year courtesies were extended to members of the U. S. Biological Survey and commissions of other States.



## WILD BIRDS AND ANIMALS

### WINTER FEEDING

Owing to the open winter practically no feed was distributed for the wild stock in the field.

### BREEDING SEASON

We experienced again this year an unusually favorable breeding season for all wild life, due to the second year in succession of extraordinary drought conditions. The uniform and mild temperatures, and the absence of cold, wet rains, were very beneficial.

### FIRES

The absence of any threat of forest fires made it possible to open the trout fishing season on the regular schedule. It became necessary, however, on account of the excessive dryness, for the Governor to close the woodlands beginning at sunset on April 30. Conditions growing worse, a second proclamation suspended any open season on fish from midnight of May 7. The ban on entering the woodlands was lifted and the fishing season reopened by proclamation dated May 15. The same proclamation extended the open season on brown, loch leven, rainbow and brook trout, from July 31 to August 8, inclusive, thus restoring the days which had been lost.

The drought conditions of the summer and late fall made it advisable for His Excellency, the Governor, to close the woodlands to the public at sunset on the 14th of October. Fortunately, rains came in time to permit lifting the ban on October 16, which allowed the opening of the hunting season at the regular time. During the season there was sufficient rainfall to avoid any necessity of closing it.

### POSTED LAND

Somewhat more than the average amount of posting of land has taken place. Whether this is the forerunner of a steady reduction in the amount of land open to our urban dwellers for recreational purposes, remains to be seen. We have great confidence in the democracy of our landowners, who continue to permit the public to have large privileges to go on their lands for recreational purposes of all kinds. We reaffirm the statement made in earlier reports and other writings, that if and when the time comes that the public is excluded from substantial portions of privately owned lands, it will be due only to the fact that the landowners have been compelled to adopt extreme measures in order to protect themselves against the thoughtless and the vicious element; or, from the passage of legislation, by the votes of our urban dwellers, placing such restrictions on the landowners as cause them to resort to retaliatory measures.

A certain amount of land is posted by individuals and groups in order to make such posted areas wild life sanctuaries for all our wild life, including the song and insectivorous birds, and game birds and quadrupeds. But the fundamental weakness of the plan is such areas immediately become a haven for those species of wild life classed as vermin. There are other things of much greater importance to be done to bring about an abundance of wild life on a given area, than the exclusion of vermin, the hunter and the trapper. Without entering into a lengthy discussion it is sufficient to enumerate two of these things, — the planting of adequate cover and food supplies, and the reduction of the predatory species or insatiable killers to a harmless minimum.

The extent to which the fishing privileges on our principal streams are being slowly acquired by individuals and limited groups, is centering public attention more and more on our recommendation of years ago, that the fishing privileges, together with strips of land on either side of the streams, be acquired to provide public fishing grounds for all time.

## MIGRATORY BIRDS

*Song and Insectivorous Birds*

We continue to lay as much emphasis on the protection of our song and insectivorous and harmless non-game birds, as on the protection of those classed as game. Considering the extent to which the former class is protected throughout the United States, it is mystifying that their numbers should not increase more rapidly from year to year. However, this is not to be wondered at when the destructive forces of nature, such as a cold, wet spring, and the contrivances of man, are considered.

*Migratory Game Birds*

**SHORE BIRDS.** — There has been no change in the Federal regulations continuing a closed season on all species of shore birds. Sentiment in favor of reopening the shooting season on some of the larger species continues to develop.

It will be interesting to note the extent to which the migrations of these birds along our coast will be affected by the drainage operations now in progress in connection with mosquito control work. While these operations may not affect the food supply, they will undoubtedly render less attractive many areas where formerly the birds were inclined to congregate and linger for a while. The general opinion prevails that the larger species of shore birds show steady increase, and that among the smaller species this is especially noticeable. However, we have not recovered to the point where the increase can be regarded as substantial.

**POLOVER.** — The rather heavy spring migration continues to occur in the Cape section. During the summer and fall migration a slight increase can be recorded over that of recent years. This is a general statement relative to the golden and black breasted plover.

The status of the upland plover still remains in doubt, for only a limited number breed in this State.

The same may be said of the piping plover.

**SNIPES.** — The spring migration was of usual proportions. Despite the drought conditions that prevailed, the fall flight was heavier and more widely spread out than in recent years.

**WOODCOCK.** — The number breeding in the State is annually on the increase. More birds were reported this spring over a wider range than can be said of recent years; and the breeding season was favorable. There was a good stock of birds, widely scattered across the State, when the season opened October 20. Excellent shooting was enjoyed during the first few days, and then the birds seemed to thin out. It can be debated world without end whether these were native reared birds or the vanguard of the first flight — our own locally reared birds having moved on. The weight of opinion favors the assumption that these are native reared birds, which are either killed by the gunners or pushed out of the covers and started. Then generally follows a lull of from a week to ten days, with flight birds continuing up to the close of our season on November 20. It is interesting to record that annually we are notified of numbers of woodcock being seen during the deer season, which covers the first week (or two weeks) in December (depending on the county). It is safe to say that from year to year a steady increase in the number of woodcock is occurring. On the other hand, more sportsmen are becoming interested in this bird and its pursuit than was the case even five years ago.

**RAILS.** — Owing to the drought conditions fewer rails were reported. This bird is not really considered a game bird in this State.

**SANDPIPERS.** — The smallest species of shore birds classed under this title continue to show a steady increase.

**WINTER AND SUMMER YELLOW-LEGS.** — The spring flight was of average proportions. Summer and fall migrations were marked by fewer birds being seen in certain localities where formerly more abundant. At some points on the line of migration they were reported in slightly increased numbers.

**CURLEW.** — From year to year there appears to be a slight but steady increase in the number of curlew, particularly the Hudsonian. Sickie bills are observed in this State but rarely.



**DUCKS.** — We have long felt it advisable to make experiments in the planting duck feed in our coastal and inland waters. On the other hand, most of the locations where the work should be done are such that only a limited group of sportsmen who had control over the shooting privileges would benefit. We have attempted to encourage these control groups to make the expenditures rather than for the Division to assume them. However, during the year we received a suggestion from the Middlesex County League of Sportsmen's Clubs that an experimental planting of foods be made in that county. Joseph C. Kelley, past president of the Framingham Fish and Game Club, volunteered to plant such food as might be supplied by the Division. An order was placed to be shipped to Mr. Kelley and under date of April 23 he reported as follows:

"On April 10, 1930, I received the following wild duck food from the Wisconsin Aquatic Nurseries, Oshkosh, Wisconsin: 100 wild celery plants; 100 duck potato tubers; 80 lbs. wild rice seed; 15 lbs. smartweed seed; 15 lbs. wild duck millet seed. On Sunday, April 13, four members of the Framingham Fish and Game Club assisted me in planting the wild rice, wild celery and the duck potato tubers. About two-thirds of the wild rice and all of the wild celery plants were planted in the Sudbury River within a quarter of a mile of Hurds Pond. The balance of the wild rice and all of the duck potato tubers were planted in Hurds Pond on the northwest side. The wild duck millet and the smartweed will be planted on the shores of the Sudbury River opposite the northwestern part of Hurds Pond. At the present time the water is too high to plant this seed. Within a week or two it is expected that the waters will be lower so the ground can be worked satisfactorily."

The wood duck has registered a strong increase. The season appeared to be particularly favorable, for numerous large flocks were reported from all centers where wood duck breeding grounds are still available.

Mallard, teal, pin-talls and canvas back ducks are taken each year, but do not constitute much of a percentage of the sportsman's bag.

Red heads and blue bills continue subnormal, both on spring and fall flights, but there is indication that these birds are gradually working back to the numbers that formerly frequented limited portions of our coastal area.

The black duck continues to be the main source of supply. There are more ducks generally than has been noticed for several years. We continue to emphasize that whether we will continue to have an increase in the black duck population depends entirely on the extent to which we will make sanctuaries out of some of the more favorable breeding areas and create other conditions more helpful to these birds. There are hundreds of small areas in which these ducks could be induced to breed if the conditions could be created for them, but under the existing order, where most of the locations referred to are under private control, there is relatively little that can be done by the State. A start this year was made in planting duck foods in Middlesex County, and the results of this experiment will be watched closely as bearing on future developments. It is idle to talk of increasing the stock of black ducks unless they are given suitable breeding grounds, free from vermin and disturbance, together with an adequate food supply.

**GEESE.** — From December 1, 1929, when this report opens, through the remainder of the hunting season of that year, to January 15 of this year, the flight was somewhat less than the past few years, and the birds were not, as a rule, in the best physical condition. Substantial numbers of birds continue to winter in such regions as Martha's Vineyard and Chatham. The fall flight (to November, 1930) started later than usual, but during the month of November there was a relatively heavy flight of geese. It is gratifying to note they are reported from all points as being in excellent condition.

On the area where brant are found, after December 1, 1929, to the close of the hunting season on January 15, 1930, brant were reported in about usual numbers. There was nothing unusual in the spring migration. Prior to the close of this report (November 30), substantial numbers of birds have been noted on migration.

**STATISTICS OF THE GUNNING STANDS.** — The revision of the inland fish and game laws requires the licensing of all gunning stands.



While the law does not require reports from these stands, the usual data were collected to continue the statistics which have been compiled over a period of years, through the courtesy of the stand owners. Number of stands licensed, 284; number of reports received, 274; ducks shot, 17,586; geese shot, 7,424; live duck decoys used, 7,562; wooden duck decoys used, 5,877; live goose decoys used, 8,518; wooden goose decoys used, 5,797.

### *Migratory Non-game Birds — Gulls and Terns*

These birds seem to be holding their own, but without the substantial increase which would ordinarily be expected. It is as difficult to account for this state of affairs as in the case with our song and insectivorous birds. We continue to annually receive some complaints that these birds have become a nuisance in connection with certain waters used as water supplies, but so far no serious case of pollution has been made out. Complaints from owners of pleasure craft are annually received of the fouling up of boats by these birds, but no movement has yet appeared demanding a reduction in their numbers on this account.

### *Federal Control of Migratory Birds*

Representatives of the Bureau of Biological Survey of the United States Department of Agriculture have been engaged in making a preliminary survey of the possibilities of the State for wild life sanctuaries, resulting from the signing of the Norbeck-Andresen Migratory Bird Conservation Act, passed by Congress last year. This has simply been a preliminary investigation, but no definite action has been taken with reference to any particular area. It is doubtful whether any Federal funds should be expended in this State until the principal breeding grounds throughout the country have been acquired and developed, and sufficient sanctuaries provided in the wintering zone.

### UPLAND GAME

#### *The Hunting Season*

The drought conditions described in our reports for last year obtained throughout the entire State this year also, intensified, if anything. However, these dry years appear to be very favorable to the hatching and growing of upland game birds. It was considered necessary to close the woodlands on the fourteenth of October, but, fortunately, rains permitted lifting the ban so there was no postponement of the opening of the hunting season on October 20. There was no necessity for considering the closing of the season during the regular open period. There was fair weather during the early part of the open season, and on the last two days; but during the season were two Saturdays of hard, steady rains. Mild weather prevailed throughout practically the entire season.

**PHEASANTS.** — There continues to be an agitation in some localities, for an open season on hen pheasants. In 1927 we submitted to the sportsmen a questionnaire with carefully prepared arguments for and against an open season on hen pheasants, and the sentiment was overwhelmingly in opposition. This year, because of the agitation, we again submitted the proposition to the local organizations on much the same statement of the case, and again there was overwhelming opposition to an open season.

We believe that the policy of carrying through the winter and liberating in the spring as many birds as possible as adults, is slowly but surely bearing fruit. Many comments are received to the effect that there appears to be an abundance of birds immediately prior to the opening of the season, with a corresponding scarcity after the season has been opened for a short time. This bird seems to know enough to get out of the way quickly, in a manner that is almost uncanny. We labor under the difficulty in stocking the entire State with pheasants, that large portions of it are not suitable for this bird. But, by liberating the adults shortly before the breeding season, there is a tendency to localize them over a larger range than would be the case were they all liberated in the late summer

and fall. In any event, it supplies a game bird over a substantial area where neither quail nor ruffed grouse would be found.

The record of pheasants shot during the open season of 1930 cannot be given as has been done in past reports, because, under the present law (which went into effect this year), hunters are not required to turn in their reports of game taken in any one year until between January 1 and 31 of the year following.

**RUFFED GROUSE.**—Whether or not there would be an open season on ruffed grouse this fall had to be settled during this year's session of the Legislature. This for the reason that an open season would take place in the absence of any legislation to the contrary. It is extremely unfortunate, from the standpoint of the best wild life administration, that the decision as to whether there will be an open season or not on a given species, must be determined months in advance of knowing the results of the breeding and rearing period. However, the reports collected during the spring months (the legislature adjourned on May 28) indicated that there was a sufficient stock of birds throughout the State as a whole, to justify an open season. The sportsmen had proposed a close season for 1928, and then advocated continuing it through 1929. It was felt, that under all the circumstances, the stock was sufficient to justify an open season of at least some length, and that it would be better to have such open season than to run the risk of widespread dissatisfaction on the part of the sportsmen in not opening when conditions were reasonably favorable. By this system our hunters are rapidly becoming educated up to the idea of close seasons when they are necessary.

Fortunately, the breeding season was very favorable and a substantial number of grouse were reported throughout the State. Conditions were somewhat "spotty," as will always be the case. For example, a close season was opposed by several small groups in 1928 on the ground that in their respective localities there was a usual crop of birds. This year, with an open season, there were some localities where the birds were scarce; but, taking the State as a whole, the birds have stood the strain and it has been demonstrated to the sportsmen that the seasons will be opened (after a closed period) just as soon as conditions reasonably warrant. There is a growing sentiment in favor of giving the Director greater latitude in determining what shall be the open seasons on all species of wild life classed as game, which is in line with the modern conception of wild life administration.

By the beginning of the year, the ruffed grouse were practically extinct on Martha's Vineyard. Whether the causes for the disappearance of the heath hen colony were at the bottom of the disappearance of the grouse, can never be determined, for no specimens of dead grouse were ever found and sent to the Division for autopsy. It is very doubtful whether the birds were gradually thinned out by illegal shooting, for a close season on these birds has been in effect on Martha's Vineyard continuously since 1926.

There being sufficient suitable cover on parts of the island for an experiment, it was considered advisable to undertake a restocking. Twenty ruffed grouse were ordered from D. H. Bendick of Leduc, Alberta, who shipped 24 birds (the additional ones being sent to insure the safe arrival of the number ordered.) The grouse arrived on December 17, 1929, and of the 24, six were dead. These were sent to Dr. E. E. Tyzzer of the Harvard Medical School, but proved too decomposed for autopsy. The remaining 18 appearing in healthy condition, they were banded and liberated, 9 on the farm of Francis A. Foster, Esq., and 9 on the estate of ex-Senator William M. Butler, both in West Tisbury.

A generous contribution from Mr. Steven W. Carey, Jr. (already mentioned under Acknowledgments), made it possible to import an additional lot of grouse. Twenty-four were ordered, and 26 received on February 10, five of which were dead. The remaining 21 were banded and liberated, 9 on the farm of Francis A. Foster, Esq., and 12 on the estate of ex-Senator Butler, though in different localities in each case, than the first lot. One of the liberated grouse was picked up dead next day. The dead birds in the second lot were unfit for examination.

Reports from the island during the year up to the time of the close of this report (November 30) indicate no benefit from the stocking.

(For account of experimental work on grouse breeding, see report of the East Sandwich Game Farm.)



**QUAIL.** — The favorable breeding season for all upland birds worked also to the advantage of the quail. It is safe to say that in the counties where quail shooting has been open for years, there was the largest stock of quail in a generation. In Norfolk County, which is now closed, there appears to be a sufficient stock to warrant an open season next year. In the other closed counties the birds are making a steady increase.

We have already described a special stocking of Martha's Vineyard with ruffed grouse. Another opportunity for a clean-cut experiment in restocking existed on Nantucket at the beginning of this year. Quail, which at different periods in our history were abundant on Nantucket and Tuckernuck Islands, had become extinct. On April 22, the superintendent of the Marshfield Game Farm took to Nantucket and personally liberated, with the assistance of members of the Nantucket Sportsmen's Club, 15 pairs of Bob White quail. These were partly from Virginia, and partly (through exchange) from the wild life sanctuary maintained by Phillips Academy, Andover, Mass. The quail from the sanctuary had been reared during the previous year, from Virginia stock. Ten pairs were those purchased with money donated by Stephen W. Carey, Jr. (already mentioned under Acknowledgments), and the other 5 pairs were paid for from divisional funds. The birds were liberated in the presence of Edmund P. Crocker, President of the Nantucket Sportsmen's Club, John Egle, Victor Bartlett, Walter Royal, Ralph Pierce, and G. Robert Grimes. The quail arrived in perfect condition, and were liberated in the following localities: Bartlett Farm Pines, 6 at the west end and 4 at the east end; Maddequet, 6; Trott Swamp country, 4; Surf Side Road Pines, 4; Miacomet Valley, 6. The birds were seen at various times after liberation.

Reports indicated that some of the pairs raised broods. At least three separate broods were reported throughout the year, all at such widely separated points that it is safe to assume they were different broods. One was seen near Polpis several times. Several reports have been made of quail being heard, though not seen, late afternoon from sections near Trott swamp, where four quail were liberated. It is interesting to note, at the close of the period of this report, that the quail have worked into the easterly section of the island, one brood having been reported near Sankaty Light, Sconset, nearly seven miles east of the most easterly point where birds were released.

The Setter Club of New England imported thirty-seven quail for field trials, and these were released by them on April 19-20 on the Chamberlin Farm on the road from Concord to Carlisle. A resident of that town fed the quail for a month after their liberation, and reported the full number had survived intact. He visited the locality frequently from May to September inclusive. He found that the quail paired up and were scattered over a large mowing field where liberated. As the adjoining farms were not visited, the full extent of their breeding is unknown. But later in the season two broods were found on the Chamberlin farm, one of fifteen and another of thirty. The latter were mixed, both young and adults. Later, report was received of another brood on an adjoining farm half a mile away.

**DEER.** — The yearly history of the white-tailed deer in Massachusetts makes an interesting story. These animals seem to hold their own in the face of extraordinary conditions. The deer population has steadily increased over the years to where it has come sharply in competition with agriculture. This extends not only to the destruction and injury of fruit trees, but down to crops, including florist products. The sum annually paid by the Commonwealth for damages wrought by the deer has been steadily on the increase. As a result of these conditions, there was an open season of two weeks throughout the State in 1928; in 1929, the period was two weeks with the exception of Plymouth County, where it was one week; and by the revision of the inland fish and game laws which went into effect this year, the season is established at one week (except in the counties of Berkshire, Franklin, Hampden and Hampshire, where it is two weeks, with no open season whatever in Nantucket County).

During the open season in December, 1929 (the season coming within the period of this report), the total kill was 2,763 deer (1,400 bucks and 1,363 does). The kill is divided by county as follows: Barnstable, 254; Berkshire, 738; Bristol, 67;



Dukes, 1; Essex, 25; Franklin, 458; Hampden, 442; Hampshire, 249; Middlesex, 63; Norfolk, 6; Plymouth, 86; Worcester, 362; Locality not reported, 12. This is the largest number of deer taken in any one year since there has been an open season. This is all the more remarkable, because at the opening of the hunting season there was no snow throughout the State except at points in the western part, making the conditions favorable to the deer and adverse to the hunters.

Deer shot while damaging crops numbered 63.

The total payments for deer damages during the year amounted to \$4,908.04, as contrasted to \$10,751.03 in 1929. Whether this is due to the heavy kill, or because the deer have been more completely driven away from agricultural sections, remains to be seen. There were brought over into 1930 (because in process of appraisal) and paid, 4 claims filed in 1929, amounting to \$34.65; in 1930 there were received 117 claims which were approved and paid in the amount of \$4,873.39; and there were received 2 claims which will be approved and paid within the next fiscal year — making a total of 121 claims paid this year totalling, as above, \$4,908.04.

**SQUIRRELS.** — The gray squirrel has shown a slight increase, taking the State as a whole. The red squirrel continues to thrive, and is a destructive factor in the wild life population.

**HARES AND RABBITS.** — Despite our long open season, which is one of the longest throughout the country, the cottontail rabbit has made a great increase during the year. More cottontails were in the covers for our hunters during this fall than has been the case for years. The white hare is little more than holding its own over most of its range, although numbers are annually imported and liberated.

In previous reports we have discussed the disease tularemia which prevails in all regions over which cottontails might be imported. Our investigations confirm the wisdom of the policy of previous years, to refuse permits for the importation of these animals. The black-tailed jack rabbit is somewhat established on Nantucket, resulting from stockings made some years ago. This year, request was received to import additional jack rabbits for restocking the island. The claim was advanced that the jack was immune to tularemia. We directed eight jacks to be shipped by P. P. Doze of Pratt, Kansas, to Dr. Edward Francis of the U. S. Public Health Service at Washington, D. C., for experimental purposes. These jacks were exposed to tularemia, and contracted it, thereby proving that they are not immune to this disease. As a result of this test, no permit for importation was granted.

An experimental importation of 108 cottontails was made, from Pratt, Kansas. The rabbits were confined on the grounds of the Sutton Fish Rearing Station. Before the ten-day quarantine period was up, some of the cottontails escaped from the pen by jumping on to a sill which was placed at the top of concrete slabs forming the baseboard of the pens. Efforts were made to trap or kill all of the escapes, and there was nothing to indicate that many, if any of them, got away. The others died off from one cause or another, so that none were liberated in the covers. Some specimens of the dead cottontails were sent to Dr. E. E. Tyzzer of the Harvard Medical School, for examination, but no cases of tularemia were discovered. It was decided, as the result of this experiment, to make no further attempts to bring in cottontails on the quarantine plan.

The colony of cottontails on Penikese Island continues to thrive. For details, see the report on Penikese Island Sanctuary in the section on Wild Birds and Animals.

Experimental trapping of cottontails was made, for which see the section on Game Distribution.

Fifty rabbit traps were constructed, and 50 crates purchased.

(See also Wilbraham Game Farm for account of work looking to the production of rabbits.)

**FUR-BEARING ANIMALS.** — It is impossible to state whether or not there has been an increase or decrease in the taking of fur-bearing animals during the year, for the reason that by a change in the law, the reports of game and fur-bearing animals taken by hunters and trappers in a given year will not be filed with us until be-

tween January 1 and 31 of the following year and the volume of these reports may delay their publication until after the printing of this report.

At the November election a referendum was accepted, worded as follows:

"Shall the proposed law which amends General Laws, Chapter 131, by inserting therein a new section number 59-A, which in substance makes it a misdemeanor punishable by a fine of fifty dollars for any person to use, set or maintain any trap or other device for the capture of fur-bearing animals which is likely to cause continued suffering to an animal caught therein and which is not designed to kill the animal at once or take it alive unhurt, except traps or other devices for protection against vermin, set or maintained within fifty yards of any building or cultivated plot of land to the use of which the presence of vermin may be detrimental . . . be approved?"

During the year request was received for live muskrats for stocking Nantucket Island, but investigation showed the sentiment of the cranberry growers was opposed to such stocking, and it was not done.

### ENEMIES TO GAME

"The administration of wild life" is a phrase which has rapidly come into use throughout the country. One of the fundamentals of such administration is holding in check those animals generally classed as "vermin." In this group lie the persistent killers, such as the weasel, mink, skunk, squirrel, wild hunting house cat, gray fox, etc. These animals not only kill for food, but for the lust of killing. They operate over the surface of the State much as a forest fire, systematically destroying everything before them. This includes the eggs and young birds in the nests, adult birds incubating eggs or protecting young, and fledglings as well as the young and adults of such species as the cottontail rabbit and white hare. They hunt three hundred and sixty-five days and nights throughout the year.

As was stated in our previous report, "We do not advocate the extinction of any species that comes within this classification, but believe that they should be reduced so that a proper balance may be maintained. The time may come when the State will finance a bounty system on at least some of the worst killers, but the establishment of a vermin control squad is an immediate necessity."

Bounties of \$10 each were paid by county treasurers (under Section 133, Chapter 131, General Laws) on 89 wild cats (Canada lynx or loup-cervier) for which they were reimbursed by the Treasurer of the Commonwealth.

### RESERVATIONS

#### *Martha's Vineyard Reservation*

In our previous report the passing of the heath hen on Martha's Vineyard was recorded.

At the opening of the period of this report, December 1, 1929, one male bird continued to exist.

In the spring, Dr. Alfred O. Gross of Bowdoin College, Brunswick, Maine, made his annual spring survey, and under date of April 5 reported as follows:

"The annual heath hen census was made March 28-April 4 under the auspices of the Massachusetts Division of Fisheries and Game.

"During the year 1928 the number of heath hens dwindled from three to one lone male bird. This bird was alive at the time of the annual census taken March 30 to April 3, 1929. Though suggestions have been made to the State Department of Conservation to collect and preserve this last bird for science, it has been allowed to live its normal life among the scrub oaks on the sandy plains of Martha's Vineyard Island. It was the common expectation at the time of the last census that this bird would step out of existence before another year had passed and with its going another race of birds would be added to that endless array of extinct forms. It is truly remarkable that this lone bird, subject to all the vicissitudes of



the weather, to disease, and to natural enemies, has been able to live in solitude for such a long time.

"The bird continued to visit the farm of James Green, West Tisbury, during the early spring of 1929 and was reported as late as May 11. After that date, as was the custom of the heath hen in the past, this individual disappeared among the dense scrub oaks to live in seclusion during the summer months. In October, after going through the ordeal of moulting, it again appeared at the Green farm to announce to the world that it was still alive. It was seen at irregular intervals during the winter and since the first warm days of March it has made daily visits to the traditional 'booming' field, the old meadow along the state highway between Edgartown and West Tisbury, in a place less than a hundred yards from Mr. Green's house. Too much credit cannot be given Mr. Green who without remuneration has acted as custodian of this famous bird, the only representative of a dying race. Scarcely a day goes by but some bird lover, often from a distant part of the country, comes to this farm to pay respects to the lone survivor.

"Through the continued cooperation of the Division of Fisheries and Game, a 'blind' was placed on the field and the bird baited for nearly a month, thus making it possible to obtain field observations and photographic records of the heath hen during the period of the census.

"During the spring of former years the heath hen appeared in the open fields in the early morning hours following dawn and again in the late afternoon preceding sunset, to go through their weird and extraordinary courtship performances. The lone bird has appeared regularly this year but the courtship performance has been omitted; in fact it has not been heard to utter a single note. It generally flew out of the scrub oaks and sailed gracefully to a point near the center of the meadow. After alighting it erected its head and carefully scrutinized its surroundings, seeming to make sure that all was safe before continuing to search for food. The bird presented a pathetic figure as it stood out there all alone without any companions save the crows that had come to share the food intended for the heath hen. Though it soon started feeding it was ever on the alert for possible danger. Its eyes were much keener than those of the human observers inside the blind. On several occasions the bird crouched in the grass, his colors blending so perfectly with the surroundings that he completely disappeared from view. A minute or two later a hawk would swoop over the field, explaining the reason of the heath hen's behavior. No doubt this alertness has been an important factor in its preservation. The feeding in the open was a businesslike performance and was never interrupted by the booming and cackling characteristic of the courtship performance, which in former years occupied the greater part of the time of the males during their visits to the open fields. Not once did this male inflate his curious orange sacs and boom, for there was no female to admire him and no male to challenge him to such an exertion. Its spirit must be broken, but nevertheless it seems to enjoy its life and its freedom. It is in excellent health, it is fat and plump and in perfect plumage. From a sentimental standpoint how much better it is to permit this last heath hen to live out its normal life in its natural environment than it would be to have it stuffed to collect dust on some museum shelf.

"How long this bird will live no one can safely predict; its going is inevitable, but ornithologists, bird lovers and sportsmen the world over will have the satisfaction of knowing that all that could be done by the State, bird clubs and individuals has been done to save the species from extinction. The State department has assured us that the bird will be allowed to live, and when death comes, whether it is due to old age, disease or to violence, we will at least know that the life of the last heath hen was not wilfully snuffed out by man.

ALFRED O. GROSS,  
*Bowdoin College, Brunswick, Maine."*

Dr. John C. Phillips, at 5.30 P.M. on Sunday, September 14, while driving eastwards on the Dr. Fisher Road, about one mile west of the fire tower, saw the lone male heath hen. This bird has not been reported as having been seen since that date.



As a result of this state of affairs, the Martha's Vineyard Reservation has not been operated as such during the year, and the vacant position as caretaker has not been filled. No action has been taken as to the disposition of the area. It has been retained, thus far, as a wild life sanctuary, but without special patrol.

### *Penikese Island Sanctuary*

Decoy ducks and geese were retained on the island throughout the year, as previously. Not much progress is being made in inducing geese to use the island as a way station on migration, although we shall continue, by the use of decoys, to attempt to bring this about. Better success is experienced with black ducks. These show a gradual increase, and we believe, as time goes on, that more and more birds will use the island.

The colony of terns registered a substantial increase, both in breeding birds and in the number of young. The terns arrived and departed about on schedule. The island is very favorable to all desirable wild life in that it has no vermin and no destructive agencies except the house mouse. On July 7, Mr. Laurence B. Fletcher, Mr. Arthur Fletcher, Dr. Winsor M. Tyler, Judge Robert E. Wolcott and Mr. Henry Endicott arrived on the island for a three-day stay. They banded 2,500 birds, mostly common terns, together with some roseates and some herring gulls. In the course of the year the superintendent banded some 500 terns and 25 black ducks. There were no unusual returns on the banding reported this year. On July 8 the steamer from Woods Hole brought a large party of students from the biological school.

The colony of cottontails continues to do well. During January there were 79 rabbits trapped and shipped to the island as additions to the brood stock, and the beneficial effect was noted in the fact that the young in the spring were much stronger and healthier and survived in better numbers than ever before. It is interesting to note that this colony was first established in 1925, when 79 cottontails were liberated on the island. At that time there were no cottontails on it. The only stock added consisted of 79 wild cottontails trapped from the mainland and released in January of 1930. Distribution started in 1927, with the sending out of 240 of the animals. The annual distributions since that date have been as follows: 1928, 295; 1929, 476; 1930, 387. We give these figures to visualize what may be accomplished on a properly administered wild life sanctuary. However, it should be pointed out that conditions are exceptionally favorable to cottontails on Penikese, for the reason that there is no ground vermin and very little trouble is experienced from predatory birds.

A few quail laid and hatched on the island, but just before the rains started they left the island and none have been seen recently.

New sills and a concrete floor, as well as a mouse-proof wire grain room, were put in the so-called boat house, but which is now used for grain storage. A concrete basin was put in the upper yard, and a pump and engine installed, so that in future dry seasons a supply of water for the decoy ducks and geese is assured.

The boat was hauled out, some new planks put on, and the boat painted. A new clutch and new propeller shaft were added.

The trimmings on the superintendent's house were painted, the windows puttied, and the inside painted.

Twelve new rabbit traps were built, and shipping crates repaired.

No extensive reforestation was done, though a small amount of bushes and shrubs, such as barberry, ink berry, laurel, viburnum and blueberry were set out, and some poplar trees that had seeded themselves on the island were set out, and did well.

### *Other Sanctuaries*

The need of wild life sanctuaries should be apparent to all. We continue to stress last year's statement, "The establishment of a chain of large-sized wild life sanctuaries across the State is the surest guarantee of the maintenance of our wild life stock."

Such direction as has been possible over the smaller sanctuaries which have been given to the State from time to time, was given by the Supervisor of Fish and Game Permits and Claims. Wooden frames were made to hold posters, which were placed at the boundaries. Material was also secured for 300 small bird boxes, made for the bluebird and swallow types. One hundred larger ones were made for the flickers. Most of these had to be carried on one's back for considerable distances, as well as sectional ladders to set the boxes out of reach of passersby. The flicker boxes must be carried as high as possible into dead trees. A hook was devised, so that the upper part of the box could be easily attached to a tree, holding it conveniently while the lower part of the box is nailed in place. This device increased by more than fifty per cent the number of boxes that could be placed in a day.

Lack of funds hampers the development of our reservations in making them fully attractive to the desirable wild life that should be enticed into these areas. One of our largest reservations has not yet been surveyed. Much could be accomplished by planting food-bearing shrubs and trees in these areas.

**BOXFORD SANCTUARY.** — With the assistance of the Associated Committees for Wild Life Conservation, gypsy moths were brought under control in the new section of the Boxford Sanctuary. Also a cedar archway was erected over the new entrance on the highway. Roads were cleared, so that persons could travel on foot or horseback into an attractive area, and yet not interfere with the wild life there.

**ISAAC SPRAGUE SANCTUARY (CARR ISLAND).** — This island was visited twice. On the first trip 45 small and 15 large breeding boxes were fastened in the trees. On the second, the large wooden signs were repainted white, but the re-lettering remains to be done. White hares have increased, and, as the amount of food suitable for them is limited, a number will be transferred in the near future. The skunk noted last year was eliminated to save the ground-nesting birds. Signs of bird life were more in evidence than last year.

**EDWARD HOWE FORBUSH WILD LIFE RESERVATION, HANCOCK.** — This reservation has not yet been surveyed. It was visited twice this spring, and 50 small and 15 large breeding boxes were located along the boundaries and up the Brook Valley. Many song birds were noted in the air this spring. The water supply in this stream did not entirely dry up in the summer.

**WATATIC MOUNTAIN WILD LIFE RESERVATION, ASHBY AND ASHBURNHAM.** — Old posters tacked on trees were found to have been torn down and used by the squirrels for nests. Many posters have been replaced on boards, the cloth being covered in such a way that tearing either by animals or wind is difficult. One indefinite boundary was located, blazed, and trail-cut, so that the new posters displayed will be as visible as possible to persons hunting in the vicinity. Rabbit signs are plentiful around the lower edge of the reservation, and many birds were in evidence during migration. But little wild life is seen in the heavy woods that come well up on the mountain side.

**MINNS WILD LIFE SANCTUARY (LITTLE WACHUSETT MOUNTAIN), PRINCETON.** — A few additional posters were placed at locations where there was likelihood that persons might claim they had seen no signs. Two long boundaries come to the highway, and as certain parts of the reservation produce blueberries, many are enticed in, and this year two arrests were made as a warning that there should be no trespass in this reservation. Fifty small and fifteen large bird boxes were placed around the boundaries, but as natural nesting sites are so plentiful, not much use was made of them. After they have weathered this winter they may be more attractive to the birds. The spring on the north side, which last year was cleaned and provided with a catch basin, contained a quantity of water all summer. The small spring located for the first time this year on the east side of the hill did not run after the middle of August. A small catch basin was made, but as the ground is very porous the water goes only 10 feet from where it emerges from the side of the hill. Miss Lois Fay had galvanized tanks placed back of the stone wall and filled with water, for forest fire protection. Fire pump cans are left to be used on this reservation.



Some of the spruces set by Miss Minns were gradually being encroached upon by white birches, and some release cutting has been done to give the spruces a better chance. Three grouse were seen recently under the old wild apple trees, and two others were heard from another section of this reservation on the same day.

HENRY CABOT LODGE BIRD SANCTUARY (EGG ROCK), NAHANT; MILK ISLAND, ROCKPORT; RAM ISLAND, MATTAPOISETT. — On these small reservations there have been no special developments.

WILD LIFE SANCTUARY AT EAST SANDWICH. — The road leading from the State highway partly across lands of the Forestry Division, was partly relocated. Trees were removed at the entrance for safety. The road was carried in to the dike on the northerly side of the Johnson cranberry bog. A new drainage ditch was dug in the bog and substantial fill made to widen out the dike and the race to the level of it, so that cars may pass.

#### *Reservations under Sections 69-75, Chapter 131, General Laws*

On December 15, 1929 (falling within the period of this report), the term for which the Hubbardston reservation was established, expired.

The present law, established in the revised inland fish and game laws which went into effect August 27, 1930, gives no authority to establish reservations as formerly. The reservations in existence at the time the revision went into effect were: Millis Reservation (expiring October 29, 1930); Harvard Forest Reservation, Petersham (expiring June 20, 1933); Hinsdale-Peru Reservation, Hinsdale and Peru (expiring July 1, 1934).

## **INLAND FISHERIES**

### **GENERAL**

(Additional details concerning the individual species will be found under Propagation of Fish and Game, and Fish Distribution.)

The drought conditions described in our report of last year continued throughout this year, but with greater severity. The resulting conditions have been so fully discussed in the press and elsewhere as to require no amplification. The extent to which this has resulted in a permanent reduction of the stock of fish through the drying up of brooks, the operations of vermin made easier, the increase in temperature of the water and the lack of food, can only be determined in the future.

Spring rains of moderate precipitation improved the stream flow somewhat, but our brooks were low at the opening of the fishing season. The weather conditions throughout the trout fishing season were average. The distribution of yearling trout 6 to 8 inches long in the spring before the opening of the fishing season, seems to be the plan best calculated to give our fishermen the maximum sport. In some sections, particularly in the larger streams in the western part of the State, the early fishing was reported as excellent. The taking of sizable trout no longer excites the local comment of several years ago.

The need of public fishing grounds becomes greater every year. The revision of the inland fish and game laws which went into effect in August, provides that the "fishing rights" may be acquired by the State. This appears to relate to the fishing privilege only, but does not go far enough. The riparian owners on our unnavigable streams own the land underneath the water, and so long as they meet the requirements of the county commissioners, can place any obstructions on the streams they desire, providing they pass the volume along to the riparian owners below in equal volume and purity. The land owners can post their land and in this way exclude the public from fishing our streams. However, they have ever exhibited a tolerant attitude. The cause of alarm is the systematic leasing of the fishing privileges on some streams by individuals and private clubs which has been quietly going on for some time. The leasing of the fishing rights is only a temporary arrangement. If strips of land on either side of long stretches of these streams



are acquired by the State — the fishing privileges will be preserved for all time, and public fishing grounds in fact can be established. The acquisition of such tracts would make possible reforestation, desirable changes in the beds of the stream to permit of a larger fish life, and guarantee the public access without the complications of trespass. The interest of land owners bordering on these strips would at all times be considered through the leasing back of the strips to such land owners for a nominal amount, in reasonable term leases, subject to such regulations relative to the cutting of timber that should not interfere with all practical uses of it, such as the watering of stock and the cultivation of tillable grounds. Under the provisions of the recent revision a start was made to lease the fishing rights on one stream. It was regarded as not inconsistent with this legislation to include in the leases an option at a fixed price, on strips of land belonging to the lessors. So far the negotiations seem to indicate that the land owners (at least in the majority of cases) prefer to leave matters as they now stand, rather than to lease the fishing rights to the State although some monetary gain might be had. This is in line with the tolerant and democratic attitude of our land owners which we have stressed in our reports over the years. Many of them apparently prefer to keep their lands and fishing rights *in statu quo* rather than to lease them to private parties. Time alone will tell what progress can be made, but as the funds are available efforts will be made to cover the possibilities on at least the principal fishing streams throughout the State.

Our fish production program continues unbalanced. While our trout distribution is of substantial proportions, we are far short of making a relative annual restocking of our ponds and privately owned waters which are open to public fishing by agreement. It is for this reason we are trying to hold our trout production to about a fixed proportion until such time as we are doing an equal amount for our other fresh water fishes.

#### BROOK TROUT

The trout fishing season suffered interruption by the necessity of closing, first the woodlands and then suspending the fishing season, as detailed previously in this report under "Fires." We continue to stress the advisability of planting the annual output of our hatcheries in the spring rather than in the fall. The distribution period extends from January up to the middle of May. In other words, fish were planted, in some streams, after the season had actually opened. This is in line with the practice of several states which are recognized as among the foremost in conservation matters. It is freely predicted that the time will come when our larger streams will be systematically stocked perhaps weekly throughout the fishing season, with sizable fish from the hatcheries. The purist may object to this on the ground that tame fish of questionable edible qualities are being handed to the fishermen as a substitute for the real thing. But we have emphasized from year to year the growing artificiality of the sports of hunting and fishing in many branches. However, each year we are attempting to increase the size of our fish, believing that herein lies a solution of the problems.

#### LOCH LEVEN, BROWN AND RAINBOW TROUT

While the mass production of brook trout is a difficult matter, the breeding of brown trout and rainbow trout is even more so, at least in our waters. More interest is annually being shown in these species. The production of each is more fully discussed under the accounts of the hatchery work. However, it is sufficient to say here that efforts are being extended to increase both the number and size of brown and rainbow trout available for planting each year.

#### CHINOOK SALMON

The California Fish and Game Commission was unable to furnish Chinook Salmon eggs this year, but a consignment is expected for the work of 1931.

## WHITE PERCH

The salvage operations were carried on in cooperation with the Fish Commission of Rhode Island. The annual catch was taken from Quicksand Pond, Little Compton, R. I. This was done on the basis that we would supply the gear and some of the crew, and the remainder would be furnished by the Rhode Island trustees. While our share would have been larger had we had the facilities for transporting the fish, nevertheless a satisfactory job was done. Additional fish were taken by other salvage operations, all of which appear in the section on Field Propagation — Fish Salvage Units.

## PIKE PERCH

Interest in this species continues on the part of fishermen in several waters where the fish have continued to show, from year to year, as a result of some early plantings. Such limited stock as we have been able to procure through the cooperation of the conservation department of the State of New York, have been placed in the upper reaches of the Connecticut River. While it is one of the finest of pan fishes, and in suitable waters may have considerable possibilities, it is considered advisable not to enlarge the importation and hatching of eggs until such time as we are doing more for our native pond species.

## PICKEREL

The volume of fishing for this popular species continues to fluctuate. Viewing all of the pickerel waters of the State as a whole, it is apparent that the fishing is slowly declining from year to year, as we have previously recorded. We can only reiterate the statement in our previous report, "We do not expect these conditions to improve until there has been a reduction in the present open season. There is no fish which can stand a ten-months open season, and this season extending up to the spawning period.

So much attention over the years has been given to the artificial propagation of trout at our fish hatcheries, and the methods of rearing are so well known, that a number of local clubs have gone rather extensively into the building of local rearing units. The possibilities for similar activities in reference to pond fish are only beginning to attract the clubs. This represents a great field that today is very little appreciated. A splendid example of what can be done, is found in the activities of the Ashfield Rod and Gun Club. This club has recently bought a 100-acre farm, with buildings, and built a cement dam which floods about 14 acres, known as the Ashfield Rod and Gun Club Pond. During the winter of 1929-30 its officers stocked this pond with some brood fish taken during the ice fishing season. This fall, 12,500 pickerel were collected by the club members. Out of the lot, the Division purchased 10,000 five to nine-inch pickerel, which were planted as appears in the record of fish distribution. The remaining fish were given to local fish and game clubs throughout the district for additional plantings.

A similar project is that financed by the League of Franklin County Sportsmen's Clubs and the Shelburne Falls Chapter of the Izaak Walton League, which in the winter of 1927 leased the seven-acre Stone Ice Pond in Shelburne Falls for an experiment in raising pickerel. This was stocked with 64 brood fish taken during the ice fishing season. In the first year (1928), a loss of about 3,000 fish was sustained through drawing down the pond too fast; but in spite of this misfortune they put out 8,697 fingerlings (6-9 inch). In 1929 the pond yielded 7,194 fish (4-6 inch) and 1,025 fish (12-15 inch). In 1930 there were taken from the pond, 5,710 fish (4-6 inch) and 676 fish (12-16 inch). Also, there were transferred to the pond of the Ashfield Rod and Gun Club 106 breeders (17-24 inch).

## SMELT

Smelt fishing continues to afford enjoyment to many of our fall fishermen, and particularly those who like to frequent the salt water region. The gradual encroachments on the few streams that are recognized smelt breeding grounds in the



State, continue. We have often referred to the possibilities of the Parker River system as a breeding ground for this species. The installation of the fishways, which has been completed on this river, will be followed with great interest to see whether or not the smelt can be transported to an enlarged breeding area. Annually there is an enormous loss of eggs, due to the heavy deposit on the restricted spawning grounds.

### BASS

The former open season from July 1 to November 30 has, in the revision of the laws, been extended so that it now covers the period from July 1 to January 31. It is generally taken for granted that these fish become dormant in the winter, but the experience in our waters shows that many are taken by the fishermen throughout the year, and it was to meet this condition that the season was extended. Bass can only be artificially propagated under great difficulties and the extension of the season to where they may now be taken over a longer period will complicate and slow down the building up of an adequate stock in these waters where it is a popular fish among the fishermen.

### HORNED POUT

The horned pout is gradually forging ahead in public favor. It was given some additional protection in the recent revision. The experiences at our pond cultural unit demonstrate that with suitable rearing facilities, these fish can be produced in large numbers and of satisfactory size. It will be an important species in providing the sport to our fishermen who are more interested in catching a mess of fish than in taking any particular species.

### PONDS

#### *Public Rights*

The sentiment in favor of enlarging the public fishing grounds of the State is rapidly increasing in volume. In addition to the acquisition of fishing rights on our streams, there are great possibilities in the purchase of the sites of former mill ponds, the restoration of the dams, and the development of many ponds that would add to our natural great ponds. Another possibility lies in the restoration of the former public fishing rights in natural great ponds between ten and twenty acres. As has been pointed out in previous reports, public fishing in all natural great ponds of ten acres and upwards was guaranteed under our colonial laws and perpetuated by statute. But these public fishing rights in such ponds between ten and twenty acres were taken away and vested in the riparian owners by a special act in 1869. In past years we have advocated the revocation of this act (or the corresponding provisions in existing statutes) and the restoration of this public right of fishing. We now have the anomalous condition of the State owning all the natural great ponds between ten and twenty acres with the owners of the land around these State-owned properties controlling the fishing therein. While it may be argued that certain contractual rights have arisen since the passage of the act in 1869 as a result of which the State could not restore the public rights of fishing without compensation to the land owners, — the longer we delay in this action, the more expensive it will be. In a great many instances the damage to the riparian owners would be but nominal if the public fishing rights were restored. It would be comparatively easy to establish a process for the determination of such damages.

#### *Great Ponds Stocked and Closed*

Within the period of this report (December 1, 1929, to November 30, 1930) the following-named ponds were stocked under section 28, chapter 130, General Laws (or under the corresponding law in the new revision, section 40, chapter 131, General Laws), and regulations (Form 1) applied which will be in force for the periods named below. These regulations prohibit all fishing in the ponds from November 1 to May 30, and in all tributary streams except between April



15 and July 31. Fishing is permitted only with a hand line and single hook, or with a single hook and line attached to a rod or pole held in the hand:

Nesseponsett (also called Neeseponsett Lake; Town Pond; part of the lake is known as Middle Pond), Dana and New Salem . . . . .	From Dec. 15, 1929, to Nov. 1, 1932
Fort Pond, Littleton . . . . .	From Nov. 1, 1930, to Nov. 1, 1933
Wenham Pond, Carver . . . . .	From Nov. 1, 1930, to Nov. 1, 1933
Bare Hill Pond, Harvard . . . . .	From Nov. 1, 1930, to Nov. 1, 1933
Indian Head Pond, Hanson . . . . .	From Nov. 1, 1930, to Nov. 1, 1933

*Privately Owned or Controlled Ponds Stocked*

<i>Pond</i>	<i>Town</i>
Barkers Pond . . . . .	Acton
Black Pond . . . . .	Chatham
Buffington's Ice Pond . . . . .	West Brookfield
Coes Reservoir . . . . .	Worcester
East Acton Pond (Wetherby Pond) . . . . .	Acton
Electric Light Pond . . . . .	Monson, Palmer
Ellis Pond . . . . .	Norwood
Fountain Lake . . . . .	Springfield
Goshen Reservoir Lower . . . . .	Goshen
Grew's Pond . . . . .	Falmouth
Gunners Exchange Pond (Hoyt Pond) . . . . .	Plymouth
Hat Shop Pond . . . . .	Concord
Hocomocko Pond (Hoccomocco Pond) . . . . .	Westborough
Hudson Pond (Brigham Pond; Assabet Pond; Pond west of Center; Assabet River) . . . . .	Hudson
Little Island Pond . . . . .	Plymouth
Little Sandy Pond . . . . .	Plymouth
Little Wigwam Pond . . . . .	Dedham
Lost Lake (Cow Pond Meadows; Mountain Lake) . . . . .	Groton
Mannings Pond . . . . .	Townsend
Maple Springs Pond (Carr's Pond) . . . . .	Holden
Marble Pond . . . . .	Sutton
Mill Pond . . . . .	Wareham
Morey's Hole (Morey Pond; Tadmore Pond) . . . . .	Plymouth
Muddy Pond (Turtle Pond) . . . . .	Boston
Muddy Pond . . . . .	Sterling
Piper Reservoir (Abandoned Reservoir) . . . . .	West Springfield
Plunkett Reservoir . . . . .	Hinsdale
Pratt Reservoir (Williams Reservoir; Glen Echo Pond; Hick's Pond; Charlton City Reservoir) . . . . .	Charlton
Searsville Reservoir . . . . .	Williamsburg
Shaw's Pond (Murphy's Pond) . . . . .	Ludlow
Shepard's Pond . . . . .	Canton
Sunset Lake (Little Pond) . . . . .	Braintree
Triphammer Pond . . . . .	Hingham
Whitins Reservoir (Mumford Reservoir) . . . . .	Douglas

The following privately owned pond was stocked on agreement by the owners to permit the Division, in future, to take an equal amount of stock from the resulting increase:

Belchertown State School . . . . .	Belchertown
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*Breeding Areas in Great Ponds*

No petitions were received this year for the closing of breeding areas in great ponds.

### *Great Ponds Leased for Fishing Purposes*

The bill entered in the legislature to extend the authority of the Division to lease Tisbury Great Pond, was enacted as chapter 135. Pursuant to this authority, favorable action was taken on the application received in 1929 for a renewal of the lease of this pond. The new lease covers the period June 1, 1930, to June 1, 1935.

#### *Screens*

The outlet to Big Pond (also called Great Lake, Great Pond and Lake Winnisicut), Otis, was screened originally in 1917 through the efforts of the Westfield Campers' Club. By special act in 1922 the club was reimbursed for the cost of the screen. The club also assumed the responsibility of keeping the screen free from debris, in order to cooperate with the Farmington River Power Company, which controls this pond.

Early in the spring the Company reconstructed its control arrangements at the outlet, and at its own expense installed a fine new screen, with much greater capacity for clearance of the water than existed heretofore. In order that there would be no question as to the ownership of the screen, the Farmington River Power Company generously sold it to the Commonwealth for the nominal price of five dollars. The Company also agreed to assume the expense and labor of keeping the screen clean. It is a great satisfaction to report this instance of teamwork between a power company and the Division in administering the fish life in a fine body of water such as Big Pond.

#### FISHWAYS

This subject will be found treated in the Marine Fisheries section of the report, for the supervision and administration of all fishways has been assumed by the State Supervisor of Marine Fisheries.

#### POLLUTION

The pollution of our streams continues to be a source of great concern to all interested in the scenic beauties of the State and in the upbuilding of our fish stocks in inland waters. There is an imperative need of sufficient appropriation to make a water pollution survey to be the basis of taking hold of this question in a broad way, that remedial measures may be adopted which would be at once fair to the agencies of pollution and the other parties in interest.

### PROPAGATION OF FISH AND GAME

One of the problems of the Division over recent years has been the working out of a well-balanced program of restocking with both fish and game. Years ago it was discovered that trout and black bass could be artificially propagated; but the same cannot be said of those species of fish commonly known as "pond fish," including pickerel, horned pout, perch, crappie and large-mouth black bass. The result was the establishment of our fish hatcheries devoted exclusively to trout production (except the breeding of small-mouth black bass at the Palmer Fish Hatchery). Having been committed to this policy, it was natural that substantial sums should be expended in the upbuilding of these hatcheries and increasing the numbers and size of the trout produced. In addition, the trout fishermen have always been energetic in making their wants known, with little stress being laid on the production of pond species. About four years ago a start was made to balance up our fish production by setting an arbitrary limit of around 325,000 yearling trout of all species for spring distribution. It is our intention to hold the trout production to around this figure, while at the same time, as rapidly as funds will permit, completing and developing all the hatcheries, including putting all structures in first-class condition.

The production of pond species is more difficult, due to the fact that they can only be produced under natural conditions in specially constructed reservoirs, or



by trapping such fish out of closed waters (municipal water supplies or privately owned waters) for planting in open waters. A start was made in 1922 on the development of what is now known as "The Merrill Pond System," located in the town of Sutton and operated in connection with the Sutton Fish Rearing Station. The layout and the methods were quite fully covered in the report for 1929. Additional information appears elsewhere in this report under "The Merrill Pond System."

Two fish salvage units were established, and during the past few years they have made an extraordinary record in the trapping of sizeable pond fish out of closed waters. However, the expenditures for trout production at the hatcheries (together with a limited amount of small-mouth bass production at the Palmer Hatchery) greatly exceeded that annually devoted to pond fish. Where the latter species are particularly needed to stock our natural great ponds of 20 acres and upwards (which are the only waters that can be correctly designated as public fishing grounds) we believe that trout culture should be held at about the present proportions until relatively more funds are expended in the production of pond fish.

The same principle applies to the production of game birds and quadrupeds. Experimentation has shown that the English ringneck pheasant is, of all the game birds, the best adapted to artificial propagation, although the raising of such pheasants in large numbers still remains a difficult operation. Many experiments with the ruffed grouse have yielded no permanent results. The Division and its predecessors have experimented a great deal over the years in the breeding of quail, but this cannot be said to have gone beyond the experimental stage. Other experiments over the years with other species, such as the Hungarian partridge, heath hen, wild turkey, capercailzie, mallard, black and wood duck, and geese, have shown the inadvisability of breeding these birds for our covers. It was only natural, therefore, that special emphasis should be placed on the production of pheasants, resulting in the establishment of game farms for their breeding, with the result that in the past years, with a concentration on pheasants, little, relatively, has been done on quail. It is a satisfaction to report elsewhere the breeding of Bob White quail at our four game farms this year. It is our intention to limit arbitrarily the production of pheasants at the game farms, to the end that more funds can be devoted in the future to a more extensive breeding of quail up to the point where the expenditures on pheasants and quail will about balance.

Our greatest problem lies in a relative recognition of the interests of the white hare and cottontail hunters. Having over the years been committed to the expenditures at the fish hatcheries and game farms, the annual appropriations have not been sufficient to provide rapidly the funds to branch out in the supplying of white hare and cottontail stock. No one has successfully bred the white hare and cottontail rabbit in captivity on a large enough scale to make it a factor in supplying stock. Our only method of securing a supply of white hares has been by importations of live animals from Maine. Annually we have made such importations as funds would permit. An order has been placed for 3,500 white hares for 1931 as compared to 1,916 imported this year. Owing to the fact that the hares can only be successfully trapped during the period of deep snows, the collection and distribution is made under considerable difficulty and under conditions unfavorable to the hares, so far as handling and shipping are concerned. How long Maine will permit such exportation remains to be seen, for the volume has rapidly increased in recent years.

The cottontail rabbit presents the greatest problem of all. This for the reason that tularemia is present in the wild stocks in all states from which exportation is now made. We are advised by the Bureau of Biological Survey of the U. S. Department of Agriculture, that this disease does not exist in the cottontails of New England. In past years we have been in contact with Dr. Edward Francis, of the U. S. Public Health Service, and officers of the Biological Survey, and worked out a system of quarantining the importations of cottontails. It was originally felt that a quarantine of ten days would be sufficient to kill off any animals having tularemia or exposed to it. But in one importation which we authorized a local



club to make, tularemia was found in rabbits that died, and we decided that it is inadvisable to run any more risk of importing cottontails by any one, including the Division. At the present time our stock is clean. It would be a calamity if this disease should appear in our native stock under circumstances that could be traced directly to the carelessness or thoughtlessness of the Division in permitting such importations.

We have arrived at this decision only after careful and sympathetic thought on the interests of our white hare and cottontail rabbit hunters. Other things being equal, we believe they are entitled to just as much of an expenditure of funds in their interest as any other group in the State.

The only course open appears to be the establishment of colonies of cottontails in certain favorable localities, to the end that annually so many may be trapped up for distribution. Our efforts in this direction at Penikese Island are mentioned elsewhere in this report; also our past efforts and future plans for increasing the number of colonies and for the systematic trapping of cottontails (and possibly some white hares) in such places as on institutional grounds and the watersheds of municipal water supplies, toward increasing the number annually available. We are keenly alive to this problem, and shall continue to study it in the hope of devising ways and means to annually increase the number of white hares and cottontail rabbits available for restocking.

## FISH HATCHERIES

### *General*

The fish production program was quite fully stated in the report of last year. It calls for a balanced program of stock for stream fishing and stock for our other inland waters. The need of rearing stations in Essex and Berkshire counties continues, but up to the present time suitable locations have not been discovered. The annual distribution of the fish stock, including the output of the hatcheries, the pond cultural unit, and the salvage units, is becoming more and more intricate and difficult. The fish distribution committees of the over two hundred fish and game clubs and chapters of the Izaak Walton League, continue to render important service in this connection. From time to time emphasis is laid on the necessity of selecting for members of such committees men of responsibility and experience. There is increasing interest on the part of local organizations to provide rearing pools operated at club expense, for the growing of trout to larger size than our hatchery rearing facilities will permit. During the year this interest has extended to pond fish, so that now several clubs are operating small units to produce our common pond fish.

The drought conditions of the past two years have resulted in a number of instances where individuals and local organizations, either independently or in connection with our wardens and fish hatchery forces, have salvaged substantial quantities of fish that would otherwise have been lost. One value in these adverse conditions is the development of resourcefulness on the part of the rank and file of our fishermen to be on the alert to report unfavorable conditions and to assist in meeting emergencies.

In the following reports on stations, the fish have been graded on even inches. For example, all fish 2 inches in length and less than 3, are classified as 2-inch fish.

### *Amherst Fish Hatchery*

**NEW CONSTRUCTION.** — A number of stumps were removed from different parts of the premises, and the Graves tract was brushed out as a preliminary to further development.

A small dam was built above the hatchery supply pond, the land graded around it, and fifty feet of eight-inch tile pipe was laid to provide automatic drainage.

A square pool with part wood and part natural dirt sides was constructed at the northwest corner, of sufficient size and depth to carry fish through the winter.

A dam was placed in the center of the long pool on the west side of the grounds, thereby permitting more intensive use of the rearing area.

A concrete tank was built and connected with pipe on hand to utilize water from the hatchery supply pond during the time the hatchery building is not in use.

A concrete catch basin was built at the outlet of the hatchery building to insure drainage of the building, and a three-inch pipe was laid to connect this basin with the pond-rearing system so that the water running from the hatchery building could be utilized. The inside of the hatchery building was sheathed and painted; three double hatching troughs were added; and the building was given one coat of paint.

A concrete wall was placed under the woodshed back of the hatchery building.

The ground around the hatchery building and woodshed was partly graded.

Ten of the old wooden dams on the back brook were replaced with concrete dams.

The rearing pools were generally repaired, and considerable grading done around them.

A cement wall was placed under the porch of the superintendent's house, and the shingles of the porch replaced with weather boarding, and a start made on grading around the house and adjoining grounds.

The superintendent's house, the meat house, and the garage were all painted.

Some grading was done on the road leading into the hatchery grounds. Several pools on the Graves tract were enlarged to permit carrying fish through the winter.

In continuation of the reforestation program, 2,045 trees and shrubs were set out.

NEW EQUIPMENT. — The superintendent's house was equipped with an office desk.

The telephone was transferred from the Sunderland to the Amherst exchange.

BROOK TROUT. — No brood stock of brook trout is held at this hatchery.

The 61,000 brook trout fingerlings on hand at the beginning of the year were reclassified as yearlings. Of these, 4,000 were lost or unaccounted for, and the balance of 57,000 were distributed per table below.

Near the end of April 101,000 brook trout fry averaging one inch in length were received from the Montague Fish Hatchery. There were losses of 8,000 as fry, and 93,000 were reared and reclassified as fingerlings. Throughout the rearing period to date they have made an average growth. An attack of *Gyrodactylus* broke out about September 1, but, having been caught early, relatively few fish were lost. For the benefit of other fish culturists we will repeat the formula used last year at this station in combating the same disease: "All fish were successfully treated with a solution of 1 to 500 glacial acetic acid — 40 quarts of water and 3 ounces of acetic acid. A thousand fish from 3 to 6 inches may be treated in this quantity of solution, dipping 200 at a time and keeping them in the solution one to two minutes. An ordinary wash tub serves the purpose."

The brook trout were fed from April 26 to June 1 on pork livers; from June 1 to August 1 on half liver and half melts; and after that, on melts only.

Of the 93,000 reclassified fingerlings 25,000 were lost or unaccounted for, 3,000 were distributed per table below, and 65,000 averaging 4 to 6 inches in length are on hand November 30. These are being carried over for liberation in the spring as yearlings. The large loss is attributed to the unusual number of herons that frequented the hatchery during the summer, and to the presence of one or two water adders.



## BROOK TROUT DISTRIBUTIONS

[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Exchange	Totals
Fingerlings:						
3 inch . . . . .	—	1,500	—	—	—	1,500
4 inch . . . . .	—	1,500	—	—	—	1,500
Yearlings:						
4 inch . . . . .	—	1,200	—	—	—	1,200
5 inch . . . . .	—	9,600	—	—	—	9,600
6 inch . . . . .	18,100	—	—	—	1,000 <sup>1</sup>	19,100
7 inch . . . . .	20,218	—	2	—	1,000 <sup>1</sup>	21,220
8 inch . . . . .	5,880	—	—	—	—	5,880
Totals:						
Fingerlings . . . . .	—	3,000	—	—	—	3,000
Yearlings . . . . .	44,198	10,800	2	—	2,000	57,000

<sup>1</sup> These were in exchange for pond fish received in 1929.

BROWN TROUT. — This is the first year that a fish hatchery has been in operation at this station. Heretofore the eggs were hatched at the Palmer Fish Hatchery. The temperature of the water during the hatching period stood at about 42 degrees. One of the difficulties in the past, to which our losses of this species in the early stages were attributed, grew out of the attempt to hatch brown trout eggs in the much colder water of the Palmer Fish Hatchery.

The year opened with 10,000 brown trout fingerlings on hand, all of which were reclassified as yearlings. Of these, 1,850 were lost, 350 were distributed per table below, and 7,800 remain on hand November 30.

The 10,600 yearlings on hand at the beginning of the year were reclassified as adults and added to the 583 adults also on hand (a recount added 216 to the inventory of adults at the close of the last report). Of these, 61 were lost, 10,222 were distributed per table below, and 900 are on hand November 30.

During the latter part of November, 1929, there were 360,000 eggs taken. In addition, 100,000 brown trout eggs were received from the U. S. Bureau of Fisheries Station at Bozeman, Montana, in exchange for brook trout eggs; 79,840 were lost and 380,160 hatched (282,160 from eggs of the hatchery stock and 98,000 from the Montana eggs). Beef liver was fed to the fry the first month, and pork liver later, up to September 1. During September, half melts and half liver were fed. During October very little liver was fed, and none at all in November. The fish were fed by automatic feeders of a special type, designed by the superintendent. This feeder consisted of a can 3 inches in diameter and 3 inches deep, with a tin bar 2½ inches deep across the inside of the can, one-half inch from the bottom and one inch from the outlet of the can. This outlet was triangular. Such a can was placed at the head of each trough. The food dropped into it from an automatic feeding jar, the water flowed from the supply pipes into the can, and thence from the outlet of the can into the trough containing the young fish. By this arrangement the food was churned up into small particles instead of flowing out in lumps. A six-inch spout was soldered to the can, so that the water would flow in a swift current, carrying the food particles over the entire surface of the trough in a very short time. The beef liver was put through a plate with holes one-sixteenth inch in diameter. This was the only method by which the brown trout could be induced to feed. The same system was used successfully after the fish were put into the outside rearing ponds.

Of the fry hatched, 299,660 were lost, 500 distributed per table below, and 80,000 were reclassified as fingerlings. Of these, 19,875 were lost, 20,125 distributed per table below, and 40,000 remain on hand November 30 (as against 10,000 the year before). This is some encouragement toward making further experiments with these fish.

There was a large mortality in the brown trout, as has always been the case. The losses appeared to be due to gill trouble. Through the help of Mr. R. F. Lord



of the U. S. Bureau of Fisheries Station at Pittsford, Vermont, a cure was found, by the following treatment. Copper sulphate 291.84 grains are diluted in 10 gallons of water, making a solution 1 to 2,000. About 1,000 fish are dipped in one mixing, 200 at a time, keeping them submerged from one to two minutes. As a rule one dipping is sufficient.

BROWN TROUT DISTRIBUTIONS  
[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Totals
Fry (food-sac stage) . . . . .	—	—	500	—	500
Fingerlings:					
2 inch . . . . .	10,000	—	—	—	10,000
3 inch . . . . .	10,000	—	—	40	10,040
4 inch . . . . .	—	—	—	85	85
Yearlings:					
4 inch . . . . .	—	100	—	—	100
5 inch . . . . .	—	200	—	—	200
7 inch . . . . .	—	—	—	20 <sup>1</sup>	20
8 inch . . . . .	—	—	—	30 <sup>1</sup>	30
Adults (including two-year old fish):					
6 inch . . . . .	1,400	—	—	—	1,400
7 inch . . . . .	2,700	—	2	—	2,702
8 inch . . . . .	2,350	—	—	—	2,350
9 inch . . . . .	1,650	—	—	7	1,657
10 inch . . . . .	1,350	—	—	—	1,350
11 inch . . . . .	550	—	—	—	550
15 inch . . . . .	—	—	—	12	12
18 inch . . . . .	50	—	—	1	51
20 inch . . . . .	75	—	—	—	75
22 inch . . . . .	75	—	—	—	75
Totals:					
Fry . . . . .	—	—	500	—	500
Fingerlings . . . . .	20,000	—	—	125	20,125
Yearlings . . . . .	—	300	—	50	350
Adults . . . . .	10,200	—	2	20	10,222

<sup>1</sup> These were practically two-year old fish which accounts for their large size.

### *East Sandwich Fish Rearing Station*

NEW CONSTRUCTION. — The pool with board sides, which is fed direct from the Mill Pond, was repaired and enlarged.

Covers for filter boxes, and new boxes around valves, were installed.

Some repairs were made on the front entry and staircase of the Nye house, and the piazza floor was painted.

The area formerly connected with the hatchery, and now a part of the game farm, was brushed out.

NEW EQUIPMENT. — No special equipment was added during the year.

BROOK TROUT. — The year opened with 37,120 brook trout fingerlings on hand. Of these 120 were lost and 37,000 reclassified as yearlings. Of the 37,000 reclassified, 7,101 were lost or unaccounted for, 29,800 were distributed per table below, and 99 remain on hand November 30. Part of the losses are accounted for by the loss of approximately 1,300 fish averaging 4 to 5 inches, which were placed, after the general distribution, in a pool fed by water from the pond above the road, the temperature of which ranged as high as 75 degrees on hot days. The fish apparently suffered little from the high temperature, but could not survive the attacks of the night herons.

For the work of the season 70,000 fry, fed 56 days, were received the latter part of March from the Sandwich Fish Hatchery; 2,100 of these were lost, and the balance of 67,900 reclassified as fingerlings; 34,950 fingerlings were unaccounted for or lost. The fry were carried with normal losses until the week of April 26, when fungus developed. The fish were treated with both salt and mud baths for a period of about three weeks. They were fed on pork liver until July 14, when they

were changed over to a melt diet. After the fungus cleared up, there were only normal losses.

There remain on hand 32,950 fingerlings at the close of the year.

BROOK TROUT DISTRIBUTIONS  
[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Totals
Yearlings:					
4 inch . . . . .	300	—	—	—	300
5 inch . . . . .	1,200	—	—	—	1,200
6 inch . . . . .	21,900	—	—	—	21,900
7 inch . . . . .	5,250	—	—	—	5,250
8 inch . . . . .	1,150	—	—	—	1,150
Total yearlings . . . . .	29,800	—	—	—	29,800

CHINOOK SALMON. — No Chinook salmon eggs were received for the work of 1930, but eggs are expected to be received for the work of 1931.

LANDLOCKED SALMON. — As an accommodation to one of the fish and game clubs, the Division is carrying in one of its ponds, 2,000 landlocked salmon fry which the club received from the U. S. Bureau of Fisheries Station at Nashua, N. H. These will be planted by the club in waters specially adapted to them.

Montague Fish Hatchery

NEW CONSTRUCTION. — Electric service was brought into the hatchery grounds and to the superintendent's house, the meat house, camp, hatchery buildings, and loading stand.

The superintendent's house was completed, including the installation of a water supply system, steam heating plant, and electric light fixtures.

A lightning rod system was installed on the superintendent's house.

A heavy fill was made by the State Department of Public Works on the land lying between the superintendent's house and the newly constructed Turners Falls-Montague Road. The grounds around the house were graded and the lawn seeded in.

The hatchery building was relocated and rebuilt.

A number of small wooden dams on the upper part of the main brook were replaced with concrete dams.

Three oval shaped ponds were constructed on the lower part of the grounds for rainbow trout culture.

The hatchery supply pond was partly stoned up on the sides and a new concrete dam was put in.

In continuation of the reforestation program, 4,569 trees and shrubs were set out.

NEW EQUIPMENT. — Nothing was added during the year in the way of new equipment.

BROOK TROUT. — No brood stock is carried at this hatchery. The year opened with 111,955 brook trout fingerlings on hand (a recount added 4,275 to the previous inventory). Of the 111,955 fingerlings 15 were lost and 111,940 reclassified as yearlings and distributed per table below. Those yearlings six inches or over distributed to club rearing pools were distributed at a late date. Our plan is to distribute only fish under six inches to club rearing pools.

Of the 555 adults on hand at the beginning of the year, 143 were lost, 12 distributed per table below, and 400 remain on hand November 30.

This year all the brook trout eggs hatched at this station were received from the Sandwich Fish Hatchery. The first lot of 300,000 eggs arrived on December 10, and the second lot of 120,000 on December 13. It has been the practice to hatch and bring to the fry stage all the stock possible from the latter lot of eggs, and transfer them to the Amherst Fish Hatchery.

The water for the hatchery building is supplied from sand springs with an average hatching temperature of 48 degrees. The first lot of eggs received commenced to hatch on January 4, and the remainder followed on schedule. The hatch was very good, with only normal losses. There were 50,500 eggs lost and 369,500 fry hatched.

The first lot of fish started feeding on February 15 and the others continued coming on over a period of about 10 days. They were started off on pork liver, which was run through a chopping machine four times with a No. 3/32 plate. It was diluted a quarter, and strained. Feedings were first made with a feather, and later with a small bulb. At the beginning the fish were fed four times a day for a period of six weeks, and then the feeding was cut down to three times daily. This continued until into May, when the number of feeds was cut down to twice daily. It was during May that pork melts were gradually added to the pork liver in portions of 75 per cent liver and 25 per cent melts. This was gradually changed, substituting more melts each week until by July melts alone were fed. During July the feedings were cut down to once daily, starting first by skipping a day now and then from the regular schedule of twice to once, and by about the first of August no fish were fed more than once daily. It is not good policy to cut down the number of feedings at once, but to gradually skip a day now and then. Done this way, there will be no after effects noticeable on the fish.

Of the 369,500 fry hatched, 40,000 were lost, 101,000 one-inch fry were transferred to the Amherst Fish Hatchery, and 228,500 reclassified as fingerlings.

Commenting on the handling of the fish, the superintendent reports, "I find the best results can be obtained by retaining the fry in the troughs from one to two weeks, and then transferring them to the outside rearing pools. By this arrangement we experienced a minimum loss. The fry became more active and healthy, which is essential when sorting several times through the summer and growing to the yearling size."

The fish made a normal growth, and the sorting of fingerlings for yearlings was started the last of June and continued into July. The final sorting was made during October, when the undersized fingerlings were culled out and shipped to local waters. A good growth was made through the latter part of the summer and fall with many fish on hand now averaging 5 inches in length or better. The losses have been due to the usual hatchery causes, without the appearance of any disease. Each year there seems to be more and more trouble from birds, particularly the kingfishers and black-crowned night herons.

Of the 228,500 fingerlings, 4,000 (2 inch) were transferred to the Palmer Fish Hatchery, 38,915 were lost, 65,385 distributed per table below, and 120,200 remain on hand November 30.

BROOK TROUT DISTRIBUTIONS  
[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Totals
<b>Fingerlings:</b>					
1 inch . . . . .	—	19,200	—	—	19,200
2 inch . . . . .	16,000	11,500	—	—	27,500
3 inch . . . . .	16,500	1,500	—	85	18,085
4 inch . . . . .	—	600	—	—	600
<b>Yearlings:</b>					
3 inch . . . . .	6,000	—	—	—	6,000
4 inch . . . . .	—	2,590	—	—	2,590
5 inch . . . . .	875	9,910	—	—	10,785
6 inch . . . . .	22,888	600	—	—	23,488
7 inch . . . . .	45,131	550	—	—	45,681
8 inch . . . . .	23,061	300	—	35	23,396
<b>Adults:</b>					
12 inch . . . . .	—	—	—	4	4
14 inch . . . . .	—	—	—	4	4
16 inch . . . . .	—	—	—	4	4
<b>Totals:</b>					
Fingerlings . . . . .	32,500	32,800	—	85	65,385
Yearlings . . . . .	97,955	13,950	—	35	111,940
Adults . . . . .	—	—	—	12	12



**RAINBOW TROUT.** — The year opened with 8,700 fingerlings on hand, 4,900 of which were lost, and 3,800 transferred to yearlings. Of these 600 were lost, and 3,200 remain on hand November 30.

For some years small experiments with the rainbow trout were made with a few adults carried for show at this station. On December 16, 1929, 5,000 eggs were taken from this stock, which originally came from West Virginia. These eggs were incubated, requiring approximately the same length of time as brook trout eggs; 800 were lost and 4,200 fry hatched, which matured with a loss of 1,000. The balance of 3,200 were reclassified as fingerlings and transferred to a new pond located at the lower end of the water system, with a resulting higher temperature than most of the ponds on the grounds; 700 fingerlings were lost and 2,500 (800 3-inch; 800, 4-inch; 500, 5-inch; 400, 6-inch) are on hand November 30. These fish were fed first on liver and then on melt, on the same food ration as the brook trout.

A shipment of 10,000 rainbow trout eggs was received from the U. S. Bureau of Fisheries Station at Nashua, N. H., on June 3. Part of these were in exchange for brook trout fingerlings which the Nashua Station had received, and the rest were for brook trout which we are to send later. These eggs did not require as long a period to hatch as did the brook trout eggs, due to the weather and the much higher temperature. The eggs hatched very well, and the fry continued to thrive when placed out in a new pond of warmer temperature. Of the 10,000 eggs, 1,000 were lost and 9,000 fry hatched. Of these, 3,000 were lost and 6,000 (3,000, 2 inch and 3,000, 3 inch) were reclassified as fingerlings and are on hand November 30.

Realizing that it is of advantage to develop a strain of rainbows which will spawn shortly after the brook trout run in the spring, further experiments will be conducted to develop a strain of early spawning rainbows.

The year opened with 1,000 yearlings on hand, 100 of which were lost and the balance reclassified and added to the 11 adults reported on hand at the beginning of the year. To these were added 1,000 seven to nine inch rainbows, purchased from a commercial dealer the latter part of April as the nucleus of a brood stock, making a total of 1,911 adults handled. This stock was fed once a day on hog melts and some portions of clam meal were added, which proved very satisfactory. There were 202 lost, and 1,709 remain on hand November 30.

There are on hand at the end of the year 6,000 fingerlings from Nashua stock, 2,500 fingerlings from station stock, 3,200 yearlings, and 1,709 adults.

### *Palmer Fish Hatchery*

**NEW CONSTRUCTION.** — Several worn-out wooden overflows at the trout rearing pools were replaced with concrete.

The main brook from the large dam down through the hatchery grounds was brushed out and widened. In several places the banks were walled up to guard against wash from freshets.

The cement walk from the house to the garage was completed.

The raceway to the pond in front of the hatchery building was repaired.

The round concrete rearing pool was connected with the pipe line that runs from the big dam to the main trout rearing pool system.

A survey of adjoining property in connection with the possibility of constructing a large pond was completed.

The superintendent's house, the hatchery building, the ice house, and the double tenement house and the garage were painted.

A toilet building was put up near the hatchery building.

Some of the rooms in the double tenement house were repapered.

In continuation of the reforestation program, 1,507 trees and shrubs were planted.

**NEW EQUIPMENT.** — No special equipment was added at this station.

**BROOK TROUT.** — The year opened with 45,750 fingerling brook trout on hand (a recount added 1,833 to the previous inventory); 100 were lost, 45,650 reclassified as yearlings and distributed per table below.

For the work of the season 80,000 brook trout eggs were received in December from the Sandwich Fish Hatchery. Owing to the low temperature of the water at this station during the hatching period (it averages about 36 degrees) it takes the eggs about 8 weeks to hatch from the eyed stage; 2,450 eggs were lost and 77,550 fry hatched.

About April 1 the fish started to feed. During the first three months they were fed hog liver, and from then on, hog melts. While the young fish in the troughs were feeding, automatic feeders were used as these give the fish a good start before they are put in the outside pools. No experimental work has been done with automatic feeders in the outside pools.

Of the 77,550 fry hatched, 1,100 were lost and 76,450 reared and reclassified as fingerlings.

Up to about July 1 the fish were fed twice daily, and from that time on, once a day. During the summer months the temperature of the water in the pools averaged about 64 degrees. The summer was unusually warm and dry, which helped to bring the water temperature up. The fish did not obtain as good a growth this year as in past years. The reason is hard to explain, as the methods of feeding, sorting, and the kind of food used were the same as last year. However, the superintendent believes that the weather conditions had much to do with the growth of the fish. He bases his conclusions on the fact, that hatcheries outside the State have also noticed a somewhat slower growth in their fish this year. The losses were normal, and such as were suffered were caused by natural enemies. An unusually large number of snakes, hawks, bitterns, herons, etc., were noted about the hatchery this year, and the increase of these natural enemies was undoubtedly caused by the wonderful nesting season they had. Forty-nine snakes, 73 kingfishers, and 17 herons and bitterns were destroyed around the trout pools.

About the middle of September the fingerling trout developed *Gyrodactylus*, the first appearance of this disease at this station. Control measures were taken, and the fish were successfully treated with a solution of glacial acetic acid — 40 quarts of water to 2¾ ounces of acetic acid. This treatment was followed with a salt bath, dipping the fish in a solution of 40 quarts of water to 2½ quarts of salt. After the first treatment with the acid it was noticed that some of the fish developed fungus on different parts of the body, and it was thought that this was probably caused by the sore left by the *Gyrodactylus* bug. As a remedy for this, the salt bath was tried, which seemed to heal the sores. The salt bath was given the second day after the acid treatment. Approximately 3,000 fish were lost by this trouble.

To the 76,450 reclassified fingerlings were added from the Montague Fish Hatchery, late in October, 4,000 two-inch fingerlings; 20,000 fingerlings were lost and 60,450 remain on hand November 30.

BROOK TROUT DISTRIBUTIONS  
[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Totals
Yearlings:					
4 inch . . . . .	—	700	—	—	700
5 inch . . . . .	—	6,970	—	—	6,970
6 inch . . . . .	15,575	—	—	—	15,575
7 inch . . . . .	15,780	—	—	—	15,780
8 inch . . . . .	6,625	—	—	—	6,625
Total yearlings . . . . .	37,980	7,670	—	—	45,650

BROWN TROUT. — The hatching of brown trout at the Palmer Fish Hatchery was discontinued this year, and all the brown trout are now hatched and reared at the Amherst Fish Hatchery.

SMALL-MOUTH BLACK BASS. — The season started with approximately 368 adult brood fish. These fish wintered well, and in the spring were in excellent condition for spawning. To expect a good production of bass eggs the breeders must have a



good supply of natural food (shiners) before they go into their winter quarters and after they come out in the spring. A well fed bass is usually a healthy bass and will, under normal conditions, produce a good supply of eggs. However, to expect a good hatch from these eggs, a number of important factors enter into the picture. The most important are: water temperatures, condition of the breeding ponds, the sorting of the fish for sex and the non-molestation of the fish when in the act of spawning, and during the period when they are looking after their eggs and young. To insure all these conditions requires the constant attention of the fish culturist night and day. The proper distribution of the water volume and temperature controls means success or failure. If a pair of bass is molested too often they will leave the nest and eggs and not return, and as a result the eggs, or, if it happens to be the young fish (before they rise from the bed) will be a total loss. Also, if the fish are not properly paired off in each pond, the hatch is apt to be very much below normal — the reason for this is well known by most fish culturists.

Some experimenting was carried on through the year in the preparation of the breeding ponds which proved very satisfactory. At the outset in the spring at the time the beds were set we fertilized the ponds with sheep manure, using about 500 pounds to the acre. Throughout the summer at intervals of about two weeks we fertilized around the shore with a mixture of equal parts of sheep manure and superphosphate (16 per cent). This combination proved very good and as a result we were able to increase the natural food supply considerably. We also are working up a good supply of aquatic food plants in our ponds which also will help the supply of natural food.

From the bass ponds there were collected and distributed, per table below, 196,000 fry and 52,650 fingerlings. The young bass were not fed any artificial food, and depended wholly on the natural supply. The results obtained from fertilizing were most gratifying, and as a result we produced and shipped over 45,000 fry and over 12,000 fingerlings per acre from the same ponds. This represents an excellent start on this phase of bass fingerling production, and it is hoped that, through further study and experimenting with fertilizers, this record can be bettered from year to year.

The adult bass throughout the past summer were fed on hog livers and crawfish. There was an unusually large production of crawfish, and these were fed out from time to time, making an excellent addition to the livers.

To the 368 black bass adults on hand at the opening of the year were added 20 breeders (10 to 12 inches) from one of the salvage jobs. Of the breeders, 80 were lost, 7 distributed per table below, and 301 are on hand November 30.

SMALL-MOUTH BLACK BASS DISTRIBUTIONS

[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Totals
Fry:					
0-1 inch . . . . .	196,000	—	—	—	196,000
Fingerlings:					
1-2 inches . . . . .	40,500	—	—	—	40,500
2-3 inches . . . . .	6,900	—	—	—	6,900
3-4 inches . . . . .	4,700	—	—	30	4,730
4-5 inches . . . . .	300	—	—	20	320
5-7 inches . . . . .	200	—	—	—	200
Adults:					
12-14 inches . . . . .	—	—	—	5	5
14-18 inches . . . . .	—	—	—	2	2
Totals:					
Fry . . . . .	196,000	—	—	—	196,000
Fingerlings . . . . .	52,600	—	—	50	52,650
Adults . . . . .	—	—	—	7	7



**HORNED POUT.** — Of the 400 adult horned pout on hand at the beginning of the year, 100 were lost and 300 remain on hand November 30.

From the supply pond 13,000 fingerling horned pout were collected and distributed per table below.

	Open Waters
2-3 inches . . . . .	6,000
3-4 inches . . . . .	6,000
5-6 inches . . . . .	1,000
Total fingerlings . . . . .	13,000

### *Sandwich Fish Hatchery*

**NEW CONSTRUCTION.** — The wooden pools near the meat house were replaced with one large pool with natural dirt sides and bottom.

The wooden pools under the trees on the edge of the grounds were replaced with two square pools with board sides.

The cracked sides of certain cement pools were repaired.

The new roof of fireproof shingles on the meat house was completed.

Repairs were made on the fish hatchery building and the trim of all buildings painted.

Two large rearing pools were constructed on the area between the present pool system and the State road.

A strip of land off that portion of the grounds bordering on the State road was relinquished in order to assist in straightening the State road by the hatchery grounds. In return, the Department of Public Works constructed a new road from the improved State road into the hatchery grounds, representing a fine development of the hatchery.

Three new wells were driven for more water supply to the hatchery building.

In continuation of the reforestation program, 52 trees and shrubs were planted.

**NEW EQUIPMENT.** — The worn-out Ford truck was replaced with a Chevrolet truck.

**BROOK TROUT.** — The year opened with 102,400 brook trout fingerlings on hand, 1,600 of which were lost and 100,800 were reclassified as yearlings. Of these, 6,863 were lost, 88,824 distributed per table below, 1,000 (600 six-inch and 400 7-inch) were transferred to a pond on the Marshfield Game Farm on July 5 for further rearing and distribution next year as adults, and 4,113 remain on hand November 30.

Of the 4,291 yearlings on hand at the beginning of the year, 115 were lost and 4,176 reclassified as adults, and added to the 3,650 adults reported on hand at the beginning of the year, making a total of 7,826 adults. Of these, 1,782 were lost, 710 distributed per table below, and 5,334 are on hand November 30.

For the work of the year 1,200,000 eggs were taken in November, 1929, from the station brood; 61,000 were lost, 80,000 transferred to the Palmer Fish Hatchery, 420,000 transferred to the Montague Fish Hatchery, 100,000 sent to the U. S. Bureau of Fisheries Station at Nashua, N. H., in exchange for brown trout eggs which the Bureau furnished to our Amherst Fish Hatchery, and 539,000 hatched. The hatching period was 55 days, and the temperature of the water 50 degrees. The hatch was an average one. The fry started to hatch about January 1 and were carried in the food-sac stage until February 1. From that time until May 1 the fry were fed on pork liver. From May 1 they were fed about one-third pork melts and two-thirds pork liver, the amount of liver being gradually reduced until July 1. After that the young fish were fed pork melts only. Both the automatic feeders and the hand-dipper methods were used, but no difference in the growth of the fish could be noticed from the different methods of feeding. The water in which the fish were reared averaged from 50 to 68 degrees. No disease appeared at the station during the year.

Of the 539,000 fry hatched, 110,000 were lost, 1,000 distributed per table below, 70,000 (fed 56 days) were transferred to the East Sandwich Fish Rearing Station,

74,880 (fed 56 days) transferred to the Sutton Fish Rearing Station, and 283,120 were reared and reclassified as fingerlings.

There were 194,020 fingerlings lost, 20,000 (one-inch) distributed per table below, and 69,100 remain on hand November 30.

BROOK TROUT DISTRIBUTION  
[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Exchange	Totals
Eggs . . . . .	-	-	-	-	100,000	100,000
Fry (Food-sac stage) . . .	-	-	1,000	-	-	1,000
Fingerlings:						
1 inch . . . . .	-	20,000	-	-	-	20,000
Yearlings:						
4 inch . . . . .	-	-	12	-	-	12
5 inch . . . . .	-	14,100	-	-	-	14,100
6 inch . . . . .	44,750	600	12	-	-	45,362
7 inch . . . . .	25,050	500	-	-	-	25,550
8 inch . . . . .	3,800	-	-	-	-	3,800
Adults:						
10 inch . . . . .	150	-	-	-	-	150
11 inch . . . . .	185	-	-	-	-	185
12 inch . . . . .	225	-	-	-	-	225
13 inch . . . . .	150	-	-	-	-	150
Totals:						
Eggs . . . . .	-	-	-	-	100,000	100,000
Fry . . . . .	-	-	1,000	-	-	1,000
Fingerlings . . . . .	-	20,000	-	-	-	20,000
Yearlings . . . . .	73,600	15,200	24	-	-	88,824
Adults . . . . .	710	-	-	-	-	710

*Sutton Fish Rearing Station*

NEW CONSTRUCTION. — The ice house was repaired, and a new meat box built. Some papering and interior painting was done on the residence on the grounds. The chimney of the camp was rebuilt.

A chimney was built at the barn so that the basement could be utilized as a workshop.

The roof of the garage housing the large truck, was re-covered.

Repairs were made on the floor and walls of the meat house, and the building painted.

There were planted temporarily in beds at the hatchery, to be removed later to the ponds for permanent planting, 112 vines, shrubs and trees for bird feed.

NEW EQUIPMENT. — The equipment was enlarged by the addition of small nets for local salvage jobs.

BROOK TROUT. — The year opened with 40,000 brook trout fingerlings on hand, all of which were reclassified as yearlings; 5,700 were lost, 725 used for baiting heron traps, and the balance of 33,575 were distributed per table below.

For the work of the year 74,880 brook trout fry (fed 56 days) were received from the Sandwich Fish Hatchery, all of which were later reclassified as fingerlings. They were fed on liver through April and May, liver and melts through June, and melts for the rest of the year.

These fish made a normal growth, but the number was greatly reduced by disease, and indirectly by drought. A shortage of water prevailed at the beginning of the trout work from the previous year's drought, the spring supply being one-half normal. This shortage continued, and a July measurement showed 120 gallons per minute as compared with 238 gallons on July 1 of the previous year, the supply then being short from drought. The ratio of shrinkage continued until the end of the year. There was no direct loss from drought, but, because of the

need of keeping low levels in the pond for proper circulation and coolness, the loss from predatory birds was heavy, exceeding that in any previous year, crows, starlings, robins and catbirds in addition to herons and kingfishers, persistently taking fish. Herons appeared in great numbers, and the number killed equalled the number killed in the previous five years. The loss from birds was computed as about 40 per cent of the total number of fish.

Furunculosis appeared earlier than in previous years, and caused a heavier loss than usual because of low ponds, slow circulation, and higher temperature of water. In the case of this disease treatment of the fish is not practicable, but they have been handled to minimize the spread of the disease, by keeping them thinned out in the coolest water, and with as good a circulation as possible. Previous to stocking the ponds they had been sterilized with copper sulphate. This work had to be done in the period following the disposal of the yearlings kept in the lower ponds, and could not be repeated to the extent necessary, as the fingerlings were held in such upper pools as had been free from the disease until the other pools had been cleared of fish, and treated, and by this time the fingerlings were much crowded, and retarded. Since after such treatment the disease appeared four years in succession, it is probably necessary to give treatment for a more extended period, and a complete rest for a long period.

The disease disappeared with the first frosty weather. The loss due to this disease was 11,000. In 1927, when furunculosis reappeared after a lapse of four years after the original appearance, the loss was 8,000. In 1928 and 1929, the loss was 2,700 each year, not enough to materially affect production by direct loss, but doing so indirectly by preventing the fullest use of all ponds or rearing facilities, and at the same time making it difficult to hold the stock for the time needed to get the required growth for distribution as yearlings.

The total losses were 49,880, and 25,000 remain on hand November 30.

BROOK TROUT DISTRIBUTIONS  
[Not including transfers to our other stations]

	Open Waters	Rearing Pools	Study	Exhibit	Totals
Yearlings:					
3 inch . . . . .	3,625	—	—	—	3,625
4 inch . . . . .	4,780	—	—	—	4,780
5 inch . . . . .	1,280	—	—	—	1,280
6 inch . . . . .	14,870	—	—	—	14,870
7 inch . . . . .	8,080	—	—	—	8,080
8 inch . . . . .	940	—	—	—	940
Total yearlings . . . . .	33,575	—	—	—	33,575

COTTONTAIL RABBITS. — For account of rabbits held in quarantine at this station, see Hares and Rabbits in the section on Birds and Game.

## FIELD PROPAGATION AND SALVAGE WORK

### *Merrill Pond System*

The operation of this system continues to demonstrate the possibilities that lie in these pond cultural units for the production of our common food fish, such as pickerel, horned pout, perch, crappie, etc. As we have previously stated, these fishes cannot be artificially propagated in hatcheries, but must be handled on the pond cultural system. A complete description of this system was published in our report of last year.

Work of a general nature was carried on over the entire system, such as reforestation, brush cutting, grading and the straightening out of channels and lateral ditches to assist in taking the fish out of all the ponds; 8,000 trees were planted on the pond system. During the winter months considerable brush and useless lumber were taken off the system.



Two small buildings were put up to house tools.

Aerial photographs and a set of mapping pictures were made of the entire pond system.

### *Stockwell Ponds Unit*

The camp on the dam of the Arnold Pond was moved to a new location and a woodshed constructed back of it. Additional grading was done on the Arnold dam, with some stone work. Additional fill was made at the Middle Pond dam, thereby completing this dam for all practical purposes. Around the flume or outlet to the Schoolhouse Pond, additional fill was made. Around the Putnam Pond dam, additional rocky fill was made, and some progress can be reported in laying up the stone work preparatory to grading this location.

### *Sutton-Thompson Unit*

The Thompson dam was advanced towards completion, including the laying up of additional facing of stone and additional fill. The Sutton Pond dam was repaired, and some additional fill made to grade up and finish the dam. The brook bed between the Sutton dam and the head of Arnold Pond was cleaned out and straightened to permit better passage of fish. A survey and plan was made for the Sutton lower pond dam, and the site for the dam brushed out.

### *Welsh-Sullivan Unit*

Work was practically completed on the stone work construction of the dam at the Welsh Pond. This work has been in progress for several years.

### *Breeding and Production*

Breeding follows the natural laws governing the breeding of wild fish, often with very variable results. It was very poor with horned pout, and the large production of 1929 dropped to a very low figure. With crappie it was nearly normal, but not in keeping with the increased brood stock; while the decreased stock of blue gills gave an abnormal production, the largest of this species in any year. Following an abnormally large yellow perch production in 1929, the brood stock was reduced, and the 1930 production was about what was desired for distribution. The pickerel production was very light, and there were the same disappearances of the larger breeding pickerel returned to the ponds as has been noted for several years.

The general production was very good, and besides the fingerlings noted, it was large of horned pout, blue gills, crappie, and perch yearlings from the fingerling stock returned in 1929.

The production of shiners was very small, following systematic work to eliminate them. Shiners and common sunfish are the most persistent in remaining in the ponds after drainage, and annually the long continued work of cleaning out the channels and holes in the ponds is necessary to keep their numbers within bounds, but can be largely dispensed with when they are completely cleaned out. This has been done in the Sutton-Thompson Ponds with the use of copper sulphate, and when this work can be continued down through the system, the cleanout work can be done with much saving in time and detail work, as many fish remaining would be a part of the reserved stock.

### *Restocking*

The restocking was done with a continued substitution of crappie for blue gills, and an increased number of fingerlings, crappie in particular, to keep the distribution of yearlings in proper proportion with fingerlings, and to have, as far as possible, a part of each load sent out, yearlings.

The production or yield (meaning the whole number taken out in the complete drainage in the fall) was 640,000 of the fish cultivated. These 640,000 were disposed of partly by distribution, partly by return to the ponds as brood stock and some held for stocking rearing ponds and distribution during the first part of the

coming year. (Part of the distribution from these ponds as shown in the table, included fish taken in the drainage in the fall of 1929, but distributed during the fiscal year 1930.)

No stock from other sources was introduced into the ponds this year.

### *Distribution*

Distributions from the ponds for the period of this report (December 1, 1929, to November 30, 1930) were made per table below.

In the table, in estimating the sizes of the fish, the fish have been graded on even inches. For example, all fish 2 inches in length and less than 3 inches are classified as 2-inch fish. Fg.=Fingerling; Yrlg.=Yearling; A.=Adult.

	Open Waters	Rearing Pools	Exhibit	Totals
<b>Blue Gills:</b>				
1 to 2 inch Fg. . . . .	292,500	2,000	—	294,500
4 inch Yrlg. . . . .	5,311	—	6	5,317
5 inch A. . . . .	4,533	75	51	4,659
6 inch A. . . . .	2,223	50	60	2,333
7 inch A. . . . .	1,278	225	43	1,546
8 inch A. . . . .	925	—	—	925
9 inch A. . . . .	10	—	—	10
10 inch A. . . . .	10	—	—	10
	306,790	2,350	160	309,300
<b>Crappie:</b>				
1 to 3 inch Fg. . . . .	159,100	3,300	—	162,400
5 to 6 inch Yrlg. . . . .	14,995	—	—	14,995
7 to 8 inch A. . . . .	1,124	325	82	1,531
8 to 10 inch A. . . . .	64	45	180	289
10 to 12 inch A. . . . .	72	—	36	108
	175,355	3,670	298	179,323
<b>Horned Pout:</b>				
2 to 3 inch Fg. . . . .	177,942	14,500	—	192,442
3 to 4 inch Fg. . . . .	3,000	2,000	—	5,000
5 to 6 inch Yrlg. . . . .	38,340	—	—	38,340
6 inch Yrlg. . . . .	9,612	1,050	56	10,718
7 inch Yrlg. . . . .	5,259	275	14	5,548
8 inch A. . . . .	5,797	80	37	5,914
9 inch A. . . . .	797	75	37	909
10 to 12 inch A. . . . .	54	50	167	271
	240,801	18,030	311	259,142
<b>Pickereel:</b>				
3 to 5 inch Fg. . . . .	1,050	—	—	1,050
8 to 10 inch Yrlg. . . . .	557	—	12	569
10 to 12 inch Yrlg. . . . .	437	70	29	536
12 to 15 inch A. . . . .	6	125	94	225
	2,050	195	135	2,380
<b>Yellow Perch:</b>				
1 to 3 inch Fg. . . . .	8,850	300	—	9,150
3 to 5 inch Fg. . . . .	56,900	4,300	—	61,200
6 to 8 inch Yrlg. . . . .	4,970	200	4	5,174
8 to 10 inch A. . . . .	230	650	133	1,013
10 to 12 inch A. . . . .	30	—	30	60
	70,980	5,450	167	76,597
<b>Large mouth Black Bass:</b>				
10-12 inch A. . . . .	—	—	32	32
	—	—	32	32
<b>Total, pond fish . . . . .</b>	<b>795,976</b>	<b>29,695</b>	<b>1,103</b>	<b>826,774</b>

In addition, the following forms were distributed during the period from December 1, 1929, to November 30, 1930:

	Open Waters	Rearing Pools	Exhibit	Totals
Sunfish:				
4 inch Yrlg. . . . .	600	—	—	600
5 inch Yrlg. . . . .	1,200	—	—	1,200
6 inch A. . . . .	—	—	105	105
	1,800	—	105	1,905
Miscellaneous:				
Crawfish . . . . .	13,300	500	—	13,800
Tadpoles . . . . .	275,900	—	—	275,900
Shiners . . . . .	—	—	116	116
<b>Total, Sunfish and miscellaneous . . . . .</b>	<b>291,000</b>	<b>500</b>	<b>221</b>	<b>291,721</b>
<b>Grand total, all species distributed . . . . .</b>	<b>1,086,976</b>	<b>30,195</b>	<b>1,324</b>	<b>1,118,495</b>

### THE HAROLD PARKER FOREST POND SYSTEM

Several years ago preliminary investigations revealed the possibility of establishing a pond system on the westerly side of the Harold Parker Forest. During the present year a survey was made by the firm of Davis and Abbot, of Reading, for establishing contours and flowage levels preliminary to making a start on the construction of this pond unit, if and when appropriations are available. The survey determined the location of four dams on Mill Brook, and at two sites existing dams can be used as a part of any new structure. The area that can be flowed is approximately 75 acres, and this is obtained by dams of moderate size, making the flowed area large in proportion to the size or cost of the dams. At the site of the Gray saw mill on Mill Street, conditions are very favorable for the establishment of a collecting, sorting and distributing station to serve the whole system. The high stone dam will supply an ample head of water, the ground below is gravelly and level, and a forestry camp stands on the dam.

### FISH SALVAGE UNITS

In previous reports the object of this branch of the service has been explained, but it is well to restate that the Division is confronted with a great problem in obtaining a stock of our common pond fishes for restocking the great ponds of 20 acres and upwards which are, in the true sense, public fishing grounds, and those privately owned reservoirs which, by agreement with the owners, are open to public fishing. Such fish for stocking open waters (with the exception of the small-mouth black bass, which is artificially propagated at the Palmer Fish Hatchery) can only be obtained either by growing them in pond cultural units (for which see the Merrill Pond System) or by trapping them out of municipal water supplies where public fishing is prohibited.

In our desire to more nearly balance our program of fish production and distribution we keep our two salvage unit crews going through such portion of the year as this work can be satisfactorily carried on. The two fish culturists in charge of these two salvage units act as fish messengers from the time the trout distribution starts in January, up to the time conditions are favorable for starting salvage work. Thereafter they continue on salvage work until the latter part of June when the water warms up and the vegetation becomes abundant and the fish more or less dormant. The salvage operations are later resumed for a short period in the fall. The work is extremely uncertain and very baffling in some of its phases. There is a great deal still to be learned of the habits of our wild pond fish, and the periods of the year and conditions under which they can be taken. For example, in a given year, at a given time, fish may be taken in quantities; and yet, during the same period in another year, in the same waters, there will be little result. The



work is carried on by the use of stationary fyke traps. Each salvage unit has its own truck and complete set of gear.

Two fyke nets (with 200-foot leaders) to trap the fish, and a portable pump for filling the cans, were purchased for the outfit of Unit No. 1. An outboard motor was added to the equipment of Unit No. 2.

It should be pointed out that here is a great field of usefulness which today remains unexploited. During the period when the salvage work cannot be conducted, the employees in charge can be used in construction work at the game farms and fish hatcheries, in the distribution of fish and game, and in making investigations of new waters for salvage operations.

The salvage operations resulted in the collection of 294,466 pond fish (211,352 by the salvage units and 83,114 from miscellaneous jobs by Wardens) as well as 747 sunfish, carp and eels, 24 of which were used for exhibition purposes.

Of the 294,466 fish salvaged, 293,822 were distributed to open waters, 225 distributed to club rearing pools, 227 distributed for exhibition purposes, 172 were distributed to U. S. Bureau for breeders, and 20 were added to the brood stock at one of our fish hatcheries.

At Quicksand Pond, Little Compton, Rhode Island, Salvage Unit No. 1 operated from April 9 to April 28 and collected the following fish all of which were planted in open waters: 150,400 white perch (145,600 yearlings 3 to 5 in.; 4,800 adults 5 to 6 in.). Total, 150,400.

At Kenosha Lake or Great Pond, Haverhill, Salvage Unit No. 2 operated from April 22 to May 1 and collected the following fish, all of which were planted in open waters: 5 horned pout (adults 10 to 12 in.); 561 pickerel (75 adults 12 to 15 in.; 416 adults 15 to 20 in.; 70 adults 20 to 25 in.); 602 yellow perch (adults 10 to 12 in.); 2,594 white perch (877 adults 8 to 10 in.; 1,717 adults 10 to 12 in.); 1,330 small-mouth black bass (475 adults 12 to 14 in.; 795 adults 14 to 18 in.; 60 adults 18 to 22 in.). Total, 5,092.

At Millham Pond, Marlborough, Salvage Unit No. 2 operated from May 5 to May 8 and collected the following fish, all of which were planted in open waters: 15 yellow perch (adults 8 to 10 in.); 47 large-mouth black bass (adults 10 to 12 in.). Total, 62.

At Weymouth Great Pond, Weymouth, Salvage Unit No. 1 operated from May 6 to May 13 and collected the following fish, all of which were planted in open waters: 2,150 horned pout (1,225 adults 10 to 12 in.; 925 adults 12 to 15 in.); 2,750 yellow perch (2,650 adults 8 to 10 in.; 100 adults 10 to 12 in.); 4,775 white perch (2,225 adults 8 to 10 in.; 2,550 adults 10 to 12 in.); 490 small-mouth black bass (20 adults 9 to 10 in.; 230 adults 10 to 12 in.; 202 adults 12 to 14 in.; 34 adults 14 to 18 in.; 4 adults 18 to 22 in.). Total, 10,165.

At Ludlow Reservoir, Ludlow, Salvage Unit No. 2 operated from May 10 to May 19. Of the fish collected the following were planted in open waters: 318 horned pout (101 adults 10 to 12 in.; 217 adults 12 to 15 in.); 202 pickerel (60 adults 12 to 15 in.; 142 adults 15 to 20 in.); 1,055 yellow perch (980 adults 10 to 12 in.; 75 adults 12 to 15 in.); 100 white perch (adults 10 to 12 in.); 567 small-mouth black bass (140 adults 10 to 12 in.; 282 adults 12 to 14 in.; 145 adults 14 to 18 in.); 390 long-eared sunfish (160 yearlings 4 in.; 75 adults 5 in.; 125 adults 6 in.; 30 adults 7 in.). In addition, 20 small-mouth black bass (adults 10 to 12 in.) were sent to the Palmer Fish Hatchery to be used as breeders. Total, 2,652.

At North Watuppa Lake, Fall River, Salvage Unit No. 1 operated from May 16 to May 27 and collected the following fish, all of which were planted in open waters: 3,480 horned pout (2,200 adults 10 to 12 in.; 1,280 adults 12 to 15 in.); 24 pickerel (adults 20 to 25 in.); 1,400 yellow perch (100 adults 10 to 12 in.; 1,300 adults 12 to 15 in.); 4,350 white perch (adults 10 to 12 in.); 2,375 small-mouth black bass (1,775 adults 10 to 12 in.; 530 adults 12 to 14 in.; 70 adults 14 to 18 in.); 12 pike perch (adults 20 to 25 in.). Total, 11,641.

At Long Pond, Great Barrington, Salvage Unit No. 2 operated from May 20 to May 28 and collected the following fish, all of which were planted in open waters: 1,045 horned pout (30 adults 9 in.; 655 adults 10 to 12 in.; 360 adults 12 to 15 in.); 114 pickerel (15 adults 10 to 12 in.; 84 adults 12 to 15 in.; 15 adults

15 to 20 in.); 870 yellow perch (75 adults 8 to 10 in.; 695 adults 10 to 12 in.; 100 adults 12 to 15 in.); 99 small-mouth black bass (10 adults 10 to 12 in. — first used by the U. S. Bureau as breeders; 79 adults 12 to 14 in.; 5 adults 14 to 18 in.; 5 adults 18 to 22 in.); 333 long-eared sunfish (63 yearlings 4 in.; 30 adults 5 in.; 125 adults 6 in.; 95 adults 7 in.; 20 adults 8 in.). Total, 2,461.

At Wenham Lake, Wenham and Beverly, Salvage Unit No. 1 operated from May 31 to June 7. Of the fish collected the following were planted in open waters: 141 pickerel (adults 20 to 25 in.); 610 yellow perch (545 adults 8 to 10 in.; 65 adults 10 to 12 in.); 16,129 white perch (adults 10 to 12 in.); 450 small-mouth black bass (60 adults 9 to 10 in.; 365 adults 10 to 12 in.; 19 adults 12 to 14 in.; 5 adults 14 to 18 in.; 1 adult 18 to 22 in.). In addition 10 pickerel (adults 20 to 25 in.); 100 yellow perch (adults 8 to 10 in.); 20 white perch (adults 10 to 12 in.); 4 carp (adults 22 in.) were used for exhibition purposes. Total, 17,464.

At Cooley Pond, Granville, Salvage Unit No. 2 operated from June 2 to June 11 and collected the following fish, all of which were planted in open waters: 100 yellow perch (yearlings 6 to 8 in.); 7,950 white perch (5,600 adults 5 to 6 in.; 2,000 adults 6 to 8 in.; 350 adults 8 to 10 in.). Total, 8,050.

At Laurel Lake, Lee, Salvage Unit No. 2 operated on June 13 and 14 when the lake was extremely low. The Superintendent of this Unit, with two of his crew, went in and used a sweep seine and fyke nets in an attempt to catch some of the carp in the lake (for the purpose of ridding the lake of the carp which eat the other fish). He collected 36 carp 2 to 8 lbs. in weight (one weighed around 11 lbs.) and a large quantity of suckers, which he gave away to the people around the pond. The fish resulting from this operation are not included in any table in this report because they were not planted in other waters.

At Long Pond, Falmouth, Salvage Unit No. 1 operated from June 13 to June 23 and collected the following fish all of which were planted in open waters: 400 yellow perch (375 adults 10 to 12 in.; 25 adults 12 to 15 in.); 2,250 small-mouth black bass (900 adults 10 to 12 in.; 750 adults 12 to 14 in.; 600 adults 14 to 18 in.). Total, 2,650.

At Hatchet Brook Reservoir No. 3, Southbridge, Salvage Unit No. 2 operated from June 20 to June 25 and collected the following fish, all of which were planted in open waters: 60 horned pout (adults 8 in.); 40 pickerel (10 yearlings 8 to 10 in.; 10 yearlings 10 to 12 in.; 20 adults 12 to 15 in.); 50 yellow perch (adults 8 to 10 in.). Total, 150.

At Accord Pond, Hingham, Salvage Unit No. 1 operated from June 27 to July 2 and collected the following fish, all of which were planted in open waters: 14 horned pout (adults 12 to 15 in.); 37 pickerel (12 adults 12 to 15 in.; 25 adults 15 to 20 in.); 175 yellow perch (100 adults 8 to 10 in.; 75 adults 10 to 12 in.); 400 small-mouth black bass (50 adults 9 to 10 in.; 200 adults 10 to 12 in.; 125 adults 12 to 14 in.; 15 adults 14 to 18 in.; 10 adults 18 to 22 in.). Total, 626.

At Crystal Lake, Wakefield, Salvage Units No. 1 and No. 2 operated on October 10. Of the fish collected, the following were planted in open waters: 100 horned pout (adults 10 to 12 in.); 25 pickerel (adults 15 to 20 in.); 100 yellow perch (adults 10 to 12 in.); 4 white perch (adults 10 to 12 in.); 50 small-mouth black bass (adults 12 to 14 in.). In addition the following were distributed for exhibition purposes: 12 horned pout (adults 12 to 15 in.); 15 pickerel (5 adults 15 to 20 in.; 10 adults 20 to 25 in.); 15 yellow perch (adults 12 to 15 in.); 3 white perch (adults 8 to 10 in.); 10 small-mouth black bass (adults 14 to 18 in.). Total, 334.

At Johnson's Pond, Boxford and Groveland, Salvage Units No. 1 and No. 2 operated from October 23 to October 27. Of the fish collected, the following were planted in open waters: 125 horned pout (adults 10 to 12 in.); 20 pickerel (adults 15 to 20 in.); 10 yellow perch (adults 8 to 10 in.); 130 white perch (adults 10 to 12 in.); 18 small-mouth black bass (adults 12 to 14 in.). In addition, the following fish were distributed for exhibition purposes: 22 horned pout (adults 10 to 12 in.); 4 yellow perch (yearlings 6 to 8 in.); 3 white perch (adults 6 to 8 in.); 10 sunfish (adults 6 in.); 10 eels (adults 20 in.). Total, 352.

Several small jobs were accomplished, mostly by our wardens and superintendents, and the fish planted, unless otherwise stated, in local ponds:

From Haynes Reservoir, Leominster, at two different times during the year,



31,200 horned pout (23,800 fingerlings 2 to 3 in.; 4,800 fingerlings 3 to 4 in.; 1,200 yearlings 5 to 6 in.; 500 adults 9 in.; 900 adults 10 to 12 in.); 4,200 pickerel (1,200 fingerlings 3 to 5 in.; 650 fingerlings 5 to 7 in.; 150 yearlings 8 to 10 in.; 1,000 yearlings 10 to 12 in.; 1,000 adults 12 to 15 in.; 100 adults 15 to 20 in.; 100 adults 20 to 25 in.); 4,000 yellow perch (200 fingerlings 1 to 3 in.; 2,000 fingerlings 3 to 5 in.; 1,800 yearlings 6 to 8 in.). Total, 39,400.

From Temple Lyon's Pond, Orange, 20,000 horned pout (fingerlings 2 to 3 in.). Total, 20,000.

From Cranberry Burrage Bogs, Halifax, 60 blue gills (yearlings 2 to 3 in.); 65 pickerel (fingerlings 3 to 5 in.). Total, 125.

From a private pool in the rear of the residence of Charles Burr, Central Street, Mansfield, 3,010 horned pout (850 fingerlings 1 to 2 in.; 2,150 fingerlings 2 to 3 in.; 10 adults 9 in.). Total, 3,010.

From Trout Pond, Tolland, 650 horned pout (yearlings 6 in.); 1,590 pickerel (202 yearlings 5 to 7 in.; 505 yearlings 8 to 10 in.; 300 adults 10 to 12 in.; 275 adults 12 to 15 in.; 230 adults 15 to 20 in.; 78 adults 20 to 25 in.); 1,025 yellow perch (yearlings 6 to 8 in.); 136 small-mouth black bass (adults 12 to 14 in.). Total, 3,401.

From the rearing pool of the Athol Rod and Gun Club, Athol, 1,484 horned pout (1,009 fingerlings 2 to 3 in.; 300 fingerlings 3 to 4 in.; 100 yearlings 5 to 6 in.; 50 yearlings 7 in.; 25 adults 8 in.). Total, 1,484.

From a set-back of the Nashua River, Lancaster, 5,000 horned pout (3,000 fingerlings 2 to 3 in.; 2,000 fingerlings 3 to 4 in.). Total, 5,000.

From Green's Pond, Fitchburg, 600 horned pout (fingerlings 3 to 4 in.); 600 pickerel (200 fingerlings 3 to 5 in.; 200 fingerlings 5 to 7 in.; 200 yearlings 8 to 10 in.). Total, 1,200.

From Holt's Pond, Medfield, 2,380 horned pout (2,125 fingerlings 2 to 3 in.; 241 adults 8 in.; 14 adults 9 in.); 561 pickerel (50 fingerlings 2 to 3 in.; 511 fingerlings 5 to 7 in.). Total, 2,941.

From Elm Park Pond, Worcester. The following were planted in open waters: 2,200 horned pout (670 yearlings 5 to 6 in.; 500 yearlings 6 in.; 400 yearlings 7 in.; 250 adults 8 in.; 200 adults 9 in.; 130 adults 10 to 12 in.; 50 adults 12 to 15 in.). In addition 225 horned pout (adults 9 in.) were placed in the rearing pond of one of the sportsmen's clubs. Total, 2,425.

From Cargill's Pond, Plainville, 2,000 horned pout (400 fingerlings 1 to 2 in.; 1,600 adults 8 in.). Total, 2,000.

From Scott's Pond, Bellingham, 1,475 horned pout (yearlings 6 in.). Total, 1,475.

From Rifle Range Pond, Dracut, 468 horned pout (fingerlings 3 to 4 in.). Total, 468.

From Meetinghouse Pond, Westminster, 108 small-mouth black bass (8 yearlings 7 to 9 in.; 10 adults 9 to 10 in.; 80 adults 12 to 14 in.; 10 adults 14 to 18 in.). These were turned over to the U. S. Bureau's station at Nashua, New Hampshire, to be used for breeders. Total, 108.

From Crystal Lake, Gardner, 64 small-mouth black bass (4 yearlings 7 to 9 in.; 60 adults 12 to 14 in.). These were turned over to the U. S. Bureau's station at Nashua, New Hampshire, to be used for breeders. Total, 64.

From a pond of the Ashfield Rod and Gun Club, Ashfield, the following were collected and used for exhibition purposes: 8 horned pout (fingerlings 3 to 4 in.); 5 pickerel (fingerlings 5 to 7 in.). Total, 13.

## GAME FARMS

### *General*

Such changes as have been effected in artificial propagation of game birds at the farms, are explained in the accounts of the operation of each game farm following. The brood stocks of pheasants have been maintained at about the same number at each farm for several years. Efforts have been directed toward obtain-



ing increased numbers of eggs and young birds through more efficient management of fixed brood stocks than by enlarging the stocks from year to year.

Also, the brood stocks have been held to relatively small units against the time when the game farms could be developed to supply all the facilities necessary for handling the present size stocks, before making any expansion in the number of breeders.

In the report of the previous year a rather complete description was given of the Massachusetts system of producing game birds by incubator-brooder house methods, without the use of common hens for hatching and rearing the young game birds. In the individual reports of the game farms which follow, we have supplemented that description by statements of the actual operation of the equipment and the methods of feeding and rearing the young stock.

### *Ayer Game Farm*

**NEW CONSTRUCTION.** — The construction of a guard fence to enclose the portion of the farm now devoted to bird rearing, was completed. This amounts to a total of 1,700 feet of eight-foot guard fence.

Five additional portable brooder houses were added to the equipment. These are 9 feet square, with a four pitch roof, sides and roofs being sheathed with Homasote instead of lumber. The floors were also covered with this material over a sub-floor of corrugated steel. This material has excellent insulating qualities, thus conserving the heat of the brooder stoves, and is light in weight, enabling us to move the houses about with much greater facility than with wooden houses of like size. Five covered shelter pens to match each house, were also added, and Simplex brooder stoves purchased and installed.

Twenty quail breeding pens 5 x 10 x 5 ft. high, with the sides and top partly boarded in, and with winter fronts, were constructed.

Twenty-five brooder boxes of the Coleman type were purchased and fitted up with small oil-burning brooder stoves. Runs 6 ft. long and the width of the brooder boxes were built, and these rearing units mounted on a 2 x 4 framework about 3 ft. above the ground. A windproof guard fence was constructed around the area on which the quail breeding units were set up.

Ten shelter boxes were purchased to be used in connection with some of the pheasant rearing pens for the wintering of quail. A chimney of tile-lined brick was added to the incubator house. The brooder houses and pens were painted.

Two hundred eight-foot punched steel posts were added to the stock of such posts on hand, to be used for temporary fencing.

During the winter and early spring the trees were removed from ten acres of the low ground along the river. The stumps were cleaned out of three acres, and the ground put under cultivation.

A portable compression tank and small gasoline engine and pump were transferred from the Marshfield Game Farm and set up as a temporary water supply for a portion of the rearing area. The well under the kitchen in the superintendent's house was dug out and walled up with three-foot cylindrical concrete blocks.

The foundation of a garage and storage building 42 ft. x 24 ft. was put in, and part of the story-and-a-half superstructure put on. Most of the lumber for the garage was provided out of the barn, which was torn down.

No reforestation was done during the year.

**NEW EQUIPMENT.** — The farm was supplied with a Ford truck.

A saw outfit for the tractor was added.

Five Simplex oil-burning brooder stoves were purchased and installed in the new brooder houses.

**PHEASANT BREEDING.** — The year opened with 170 adult pheasants on hand as brood stock, and 456 adult pheasants on hand as egg stock. The report of the egg-stock operations appears in a subsequent section.

To the 170 adult brood stock were added 3 cocks which the wardens turned over to the superintendent (these birds had slight injuries from which they later recovered), and 60 hens, which were transferred from the 1929 egg stock, making a total

of 233 brood stock. Of these one hen was lost, one cock distributed for liberation, 3 hens sent away for pathological examination, leaving 228 (25 cocks and 203 hens) on hand at the beginning of the laying season. (Late in June 16 cocks and 116 hens were added from the 1930 egg stock.)

The birds were mated in late March in the ratio of 8 hens to a cock. From this stock 14,395 eggs were collected, to which were added 842 collected from the egg stock, making a total of 15,237. Of these, 1,692 were sent to the Sandwich Game Farm to help offset a heavy loss among the brood stock hen pheasants at that station, 730 were distributed to applicants, 3,790 were preserved in water glass for feeding purposes, and 9,025 were set; 5,449 were infertile in incubators, contained dead germs, or were otherwise lost, and 3,576 hatched. To these were added 27 young pheasants hatched from a shipment of eggs returned by one of the clubs, making a total of 3,603 young birds hatched.

The poor percentage of hatch was due to several causes — atmospheric conditions caused by the prolonged drought, and experimentation with various combinations of temperature and humidity which produced negligible results in several instances. Experiments with varying degrees of temperature seemed to indicate that the scale practiced at most of our stations over the past several years, namely 101 degrees the first week, 102 the second, and 103 from the 14th day to hatching, was the most successful. Experiments with comparative humidity were less conclusive. Some time after such experiments were started, it was discovered that the incubator hygrometers of a standard make, used to record the degree of moisture in the incubators, did not agree within several degrees when placed in the same machine. It was discovered, however, that as much damage could be caused by supplying too much moisture as when the amount was insufficient. Where too much moisture was present during the incubation period, many of the chicks were too large to permit of their turning freely in the shell while cutting their way out, or, in many cases, to be able to escape from the shell even after succeeding in chipping off the cap. Again, such chicks as hatched under these conditions appeared to become dehydrated, as it were, after being placed in the brooder houses, and suffered heavy losses during the critical ten-day period after hatching. Because of the uncertainty regarding the accuracy of the hygrometers, such data as were collected are of little value. In general, the best results were obtained by using a relatively high degree of humidity for the first week of incubation, then reducing it considerably until the twentieth day, and jumping it up as high as possible from that time until the hatch was completed.

Of the 3,603 young hatched, 1,892 were lost or escaped and 1,711 reared. These relatively heavy losses were in part due to the experimental work commented on above. The ten-day mortality among some broods was exceedingly high. This was particularly true of those broods hatched under conditions of excess heat or excess moisture. An experiment to determine the practicability of rearing on wire resulted in almost a total loss of the 100 chicks used in the experiment through cannibalism and distortion of the feet and legs. Some birds were lost after having been placed in the open range pens, a Cooper's hawk taking them in September, and later, a goshawk killed at least a half-dozen birds.

Following a series of successful experiments, early in the rearing season a radical change was made in our feeding methods as applied to the chicks. The feeding of egg in any form and of moist, or semi-moist foods, was entirely dispensed with, the chicks being hopper-fed from the start with Chapin Start-All Kernels. The only supplementary feed used was green stuff, principally Chinese poultry cabbage and some lettuce, fed from hanging nets and later from elevated wire racks. Young birds were first fed after having left the incubator twenty-four hours, and from that time on, food was kept before them at all times. They were given all the green food they would eat. Feeding in this manner resulted in an entire absence of the leg weakness formerly experienced with other methods of feeding, and in a rapid and smooth growth of feather. Check broods, fed, as in former years, with soft food containing a heavy egg content, developed strong symptoms of leg trouble by the time they had attained three weeks of age, which trouble disappeared



when the birds were shifted to an all-Kernel ration. Lay-All Kernels were substituted for Start-All at eight weeks.

Brooders were operated at 100 degrees the first week, reducing the temperature five degrees a week until 80 was reached. At this point the temperature was maintained until the birds no longer required heat, at from six to eight weeks of age, depending on weather conditions. Thermometers were hung ten inches from the chick guard around the stove and with the bulb three inches from the floor. Young birds were kept in the brooder houses and runs until eight weeks of age, then wing-clipped and transferred to large, temporary range pens. Those destined for distribution were caught up at 11 weeks of age, the stubs of the clipped feathers pulled out to promote a rapid return to a full-winged condition, and the birds carried in covered pens until shipped out to the clubs at twelve weeks of age. Birds retained as future breeders were re-clipped at intervals, being carried in open topped range pens equipped with trap pens as described later in connection with the wintering yards. All stock, eight weeks old or over, received no other food than the Chapin Kernels, supplemented by green food, the year round. Care was taken to supply clean, fresh water at all times except when snow on the ground made watering unnecessary.

Of the 1,711 young birds reared, 10 were distributed for liberation, 1,140 for wintering, and there remain on hand 561 young birds (500 hens and 61 cocks) on November 30, reserved for the 1931 egg stock.

Of the 228 adults on hand at the beginning of the breeding season 43 were lost, 9 cocks and 46 hens distributed, leaving 130 on hand to which were added 16 cocks and 116 hens late in June from the 1930 egg stock, making a total of 262 (32 cocks and 230 hens) on hand November 30.

**PHEASANT EGG DISTRIBUTION.** — To the 456 egg-stock adults were added 100 adult hens purchased from a private breeder, necessitated by losses from horned owls. Losses from the raids of these owls during the late fall and winter were very high. This was the first year that the birds at this farm were wintered in open topped yards where they were exposed to aerial attacks. By the time of writing this report, however, a plan has been worked out whereby a certain section of each wintering yard is covered with wire supported by steel posts and supporting cross ties of heavy wire. The birds are fed in this covered section, access to which is gained through a series of automatic gates which can be so set as to prevent the birds returning through them. These are set in the afternoon, and by dark, practically all the birds are safe under wire for the night. These 556 egg stock adults were further reduced by the transfer of 60 hens to the brood stock, the distribution of 1 cock and 3 hens, and the loss of 30 birds, to 462 (50 cocks and 412 hens) at the beginning of the laying season.

This stock was mated late in March in the ratio of 8 hens to a cock. The first egg was collected on April 1, and the first distribution made on April 18. All the early eggs of the first ten days' laying were incubated at the farm because of their doubtful fertility. By June 14, practically all the applicants for hatching eggs had been supplied, and the egg stock was disbanded. There is nothing outstanding to report as regards to losses among the adult birds (both in the egg-stock and the brood stock). Ovarian lesions were responsible for a large proportion, it being worthy of note that these occurred among those birds purchased in February. Very few birds were killed by cocks, and there was an almost complete absence of cannibalism, there being not above a half-dozen cases of "pick-outs" during the entire season. Another notable fact was, that at no time during the season did we have any appreciable number of bare-backed hens in our pens, despite the fact that the hitherto customary clipping of the cocks' spurs, beaks and toenails was dispensed with. We are inclined to attribute the freedom from these troubles, so serious in former years, to our being able to produce a better growth of feathers through the use of Chapin Kernels as a sole food, as described elsewhere in this report. The quality of the eggs collected throughout the season was much better than in any former year, the eggs running very uniform in size and shape, free from shell defects, and with remarkably few blood-stained eggs.

The total yield of the egg stock was 14,944 eggs, of which 14,062 were distributed



to applicants for hatching and 40 for experimental purposes. (These were in addition to the 730 eggs distributed to applicants shown under Pheasant Breeding in the report of the Ayer Game Farm.) A new method of packing whereby each egg is held in a separate compartment of a container, after being wrapped in crepe paper, resulted in a reported loss of only 5 or 6 eggs through breakage in transit. The remaining 842 eggs of the yield were set in incubators. These are accounted for with the report of brood stock eggs.

Of the 462 adults on hand at the beginning of the laying season 34 were lost or escaped, 34 cocks and 262 hens were distributed for liberation, and the balance of 16 cocks and 116 hens were transferred to the brood stock late in June.

QUAIL BREEDING. — For the first time the breeding of quail was begun at the Ayer Game Farm. Early in March, work was started on twenty quail breeding pens, 5 x 10 ft. in size and about 5 ft. in height. These were built on the general lines of the Virginia pen, but Homasote was substituted for lumber in the construction of the closed-in portion, and removable winter fronts were provided for that portion, to give additional protection in cold weather. These pens were completed by the middle of April.

The brood stock consisted of 40 birds, — 10 pairs purchased from the Virginia State Game Farm (received on March 26) and 10 pairs purchased from the White Oak Quail Farm, Richmond, Virginia, W. B. Coleman, Supt. (received on April 1). These birds were placed, five pairs to a pen, in a section of the range cleared of brush the previous fall and on which no other game birds or poultry had ever been reared. About the last of April the birds were separated, and one pair placed in each of the twenty pens. They were given a ration consisting of Chapin's Start-all Kernels, Spratt's Chicgrain in hoppers, and a mixture of charcoal, oyster shell and grit on the ground. Clabber was fed in shallow dishes, in which inverted tumblers were placed to prevent the birds from getting in and fouling the contents.

The first egg was collected on May 19. Eggs were collected on Monday of each week, four of the freshest being left as "nest eggs." This practice caused an unforeseen complication, for much trouble was experienced from the cock quail becoming broody and sitting on the eggs. The result of this was, that many eggs were pre-incubated and hatched before the rest of the eggs were due. Chicks thus hatched were all lost, as it was found to be impossible to brood them by themselves or to introduce them to broods even two or three days older. The older chicks did not trouble them, but the introduced chicks refused to associate or brood with the older ones, and soon perished of cold and starvation. At least thirty chicks were lost in this way. On cutting down the number of eggs left in the nest at each collection to a single egg, no further trouble was experienced from this source. The highest production from a single quail was 92 eggs, and the lowest, 32. Up to October, 985 eggs were taken.

Of these 985 eggs, 19 were distributed for experimental hatching purposes after the station's hatching work had been discontinued, 9 were used for exhibition at the State Governmental Activities Exposition, 6 were broken, and 951 set in incubators. Of the eggs set only 66 were actually clear or infertile, and 542 were accounted for by dead germs, chicks dead in the shell, or cripples destroyed, and 343 hatched. During the early part of the season, when quail eggs were set in incubators that were, at the same time, used for hatching pheasants, very satisfactory hatches were obtained. After we ceased to set pheasant eggs, before the middle of July, and when we became obliged to set the quail eggs alone, hatches became very poor. So little space was occupied by the comparatively small number of eggs available at any one time, that it appeared impossible to strike the proper balance of temperature, moisture and ventilation. Such chicks as hatched did not have the vitality of those hatched earlier, and the proportion of dead in the shell, and cripples, was much larger.

For the rearing, 25 brooders of the Coleman type were purchased and equipped with Putnam brooder heaters and with elevated exercise and feeding runs. The latter had floors of hardware cloth and were equipped with trays below the wire floors to catch the droppings. Ten to 15 chicks were placed in a brooder. The brooder unit was enclosed with a six-foot fence, the north and west sides of which

were covered with corrugated steel to form a wind-break. A great deal of trouble was experienced in operating the Putnam stoves. On several occasions a stove went out in the night, after the regular 11 o'clock check-up, and entire broods were lost. On another occasion, a stove over-heated and killed a brood an hour after they had been placed in the brooder. In the latter part of the season, when severe frosts occurred in the night, the stoves failed to supply sufficient heat to keep the chicks warm, and again heavy losses resulted. Over half of the total losses were directly or indirectly attributable to this one cause.

Cannibalism, principally foot-picking, and to a lesser extent, wing or beak-picking, gave some trouble, particularly in the earlier broods, and resulted in slight losses. Once discovered, there was no trouble in breaking up this habit by clipping the upper bill back to the quick and anointing the injured birds with Toe Pick. Several birds were lost through getting their feet caught in the wire, resulting in dislocations of the hip joints which necessitated destroying the birds.

Young chicks were fed on clabber alone for the first twenty-four hours after being placed in the brooders. On the second day, a feeder containing Chapin's Start-All Kernels, and another of sand, were placed before them. At the age of two weeks, Spratt's Chicgrain was mixed with the Kernels in the proportion of one part Chicgrain to two parts Kernels. Green foods, consisting of lettuce, poultry cabbage, cucumbers, tomatoes (both green and ripe), cantaloups and apples, were fed liberally, all of this material being raised on the farm. As an experiment, one of two broods of the same hatch was reared on Kernels alone, without the addition of the Chicgrain and apparently thrived and grew as well as the brood receiving the grain.

When six to eight weeks of age the young birds were transferred to 8 x 10 coops, having paper covered gable roofs and equipped with Torrey shelter boxes. Three young birds were lost from black-head after having been so transferred for several weeks.

Of the 343 chicks hatched, a total of 227 young birds were lost, leaving 116 on hand November 30.

Of the 40 adult brood stock birds on hand at the beginning of the breeding season one cock was killed in the early part of the season by flying against the wire, and was replaced by one from the Marshfield Game Farm. Four hens were lost during the breeding season, but were too badly decomposed, when found, to autopsy. Surface examination indicated blackhead as the cause of death. After the breeding season 2 hens and 3 cocks were lost. Of these, one hen and one cock were found with broken necks, apparently having been startled into sudden flight against the wire; another cock (the mate of a hen that had died earlier of what was apparently black-head) showed every indication of having died from that disease. The other hen and cock were sent to Dr. E. E. Tyzzer of the Harvard Medical School to be autopsied. He reported death due to coccidiosis. These losses reduced the brood stock to 31 (17 cocks and 14 hens) on November 30.

#### *East Sandwich Game Farm*

**NEW CONSTRUCTION.** — The guard fence was extended to enclose 32 acres of the farm now devoted to quail breeding. This is represented by 4,900 running feet of fence 8 feet high.

Twenty-five quail brooder boxes of the Coleman type were purchased, and 30 such boxes, designed at the farm, were built. All of these were equipped with six-foot runs and the whole mounted on a framework from 18 inches to 3 feet above the ground, depending on the lay of the land. Sufficient framework to hold 45 more boxes was set up.

One hundred electric heating units were assembled; 110 shelter boxes were built to be attached to the quail breeding pens. Fifty field coops were constructed for the use of bantam hens.

A building known as the power house was built, near the quail breeding area, for the electric meter, auxiliary power plant and other storage purposes, 8 x 10 ft. This is in connection with the installation of electric service, mentioned under equipment.



Eight portable brooder houses for pheasants were purchased. Movable yards adjoining these were set up with steel posts.

The framework on the large covered wintering pheasant pens was partially replaced and the tops covered with new wire netting.

A storage house 10 ft. x 18 ft. and one story high, was built on the quail breeding area. The basement is supplied with running water in concrete troughs for regulating the temperature of the supply of skim milk.

A pen 80 ft. x 230 ft., enclosing about half an acre, was constructed with vermin-proof base and sides of half-inch mesh wire and 3 x 10 iron plates, in which are placed the small breeding pens where the quail will be carried through the winter. On the road across the dike at the Johnson cranberry bog a new drainage ditch was dug, and fill started to widen the roadway.

The road from the State highway which runs in and across the State forestry plantation to the above dike, was partly relocated, the entrance widened and some fill made.

Brush and trees were removed from sections of the farm.

No reforestation work was done.

NEW EQUIPMENT. — Electric service was brought into the game farm and extended to both the quail brooder boxes and across the marsh to the pheasant section for operating a number of electric brooders installed this year for the first time. The pheasant brooder houses and incubator houses were wired.

A new small-sized Ford truck, Model A, replaced the old, secondhand one given to the Division several years ago.

One small Prairie State incubator was added to the lot on hand.

Eighteen electric brooders were added for the new and the old brooder houses. Also 2 oil-burning brooders and one coal brooder.

PHEASANT BREEDING. — The breeding of pheasants followed the lines of previous years, with some changes in methods, due to the pheasant part of the farm being supplied with electric service for the first time.

The year opened with a total of 533 (151 cocks and 382 hens) adult pheasants on hand as of December 1, to which were added 10 cocks purchased from a commercial dealer. The birds used for brood stock were carried, wing-clipped, through the winter in large uncovered yards, and were placed in breeding yards about March 15, remaining there until about September 1. The other birds (the 128 shipped away in the spring) were kept in covered yards with full wings.

From December 1 on through the year, the brood stock was fed as follows: One yard was fed exclusively Chapins Lay-All Kernels and the other three lots the regular ration of dry mash (egg mash) and scratch grain. But, inasmuch as the first-mentioned flock was ruined by a fox (as explained later) no comparison could be made of the results of the two methods of feeding.

One hundred and twenty-eight birds (68 cocks and 60 hens) were shipped away for liberation, being late-hatched birds of 1929 and full winged. Twenty were lost from all causes, and 395 (86 cocks and 309 hens) retained as breeders.

The brood stock has been carried for a number of years on the flock system during the laying period. Four open yards containing about 21,000 square feet, respectively, are used for this purpose. The brood stock was broken up into four flocks, one for each yard, with the ratio of one cock to 4 or 5 hens. The birds have been kept more or less in these pens for several years, and much of the under cover has been removed. It is the natural tangle of upland and swamp characteristic of Cape Cod, with some cultivated green crop, such as oats and buckwheat. The merits of the flock system as compared to the small units in restricted breeding pens has been often discussed and no definite conclusion has been reached. This is the only game farm where the breeders are carried on the flock system. There seems to be little difficulty in collecting the eggs, even in the tangled growth of these pens. It is certain, however, that the birds do not lay as many eggs as when confined in small units, nor is the laying season so long. The birds are kept in open pens throughout the entire year, except when driven into covered pens to be clipped.

The first eggs were picked up in the week of April 5, and the last in the week of July 12. On the night of April 27, a fox gnawed a hole through the wire of the



guard fence of one yard, and the next morning 56 (48 hens and 8 cocks) of the brood stock were picked up dead. Many had been covered over with leaves and grass. In the course of the next few days, five more hens were found, making a total of 61 killed. The reduced egg supply, by reason of this loss, was partly made up by the receipt of 1,692 eggs from the Ayer Game Farm at the suggestion of the superintendent there. In addition to these, 11,814 were collected making a total of 13,506 eggs. Of this number 20 were distributed for experimental purposes, and the remaining 13,486 were placed in Prairie State incubators, the only type used at this farm.

These incubators were operated by starting off the hatch at  $101\frac{1}{2}$  degrees (or as near that as possible) with the bulb of the thermometer resting on and between two eggs, touching each egg. It was kept as near as possible to  $101\frac{1}{2}$  the first week, 102 the second week, and 103 the remainder of the time. If, during the actual hatching, the temperature should work up to 104 or 105, there need be no cause for alarm. The sand or moisture tray was kept flooded with water during the whole incubating period. During this time, if thought necessary, the eggs were tested on the tenth day or later for infertile eggs and dead germs, though oftentimes not at all. The Superintendent states, "It is not absolutely necessary to test out the eggs at all." The eggs were turned by hand twice a day, and the trays of eggs were not allowed to cool off, only what takes place during the act of turning. The incubators were closed up at the time the first eggs showed signs of pipping and not opened until the hatch was completed, which takes place in about 12 hours. Then the door was opened, the moisture pan removed, replaced with a burlap tray, and the drop slide taken out to permit the chicks to drop on to the burlap frame. When most of the chicks had dropped down, the egg tray containing shells and unhatched eggs were removed and record of the same taken, and the ventilators opened as well as the front door to a slight extent, especially if the hatch was a good one. The ventilators were kept shut during the whole incubation period, and only opened when the young were practically all hatched and dropped down. The chicks were left in the incubator until the hatch was completed, and all of the chicks well dried off. This period, from the time the first birds emerged from the shells until the hatch was considered complete and all the birds dried off, was from 12 to 18 hours, although the chicks were not removed to the brooder until 10 to 24 hours later.

Of the total number of 13,486 eggs placed in incubators, 6,969 were infertile or contained dead germs, and 6,517 were hatched. The average percentage of hatches was about the same as last season, the eggs hatching promptly and the chicks appearing lively when dried off and ready for the brooders. The variation of the period that they were confined in the incubator after hatching did not appear to make any particular difference in the "liveability" of the chicks.

Of the 6,517 chicks hatched, 1,139 young died. The causes of loss were mostly a weakness in the young birds, rather than any certain disease. These losses take place mostly under two weeks of age. A few die later, and cannibalism develops as a rule after six weeks of age, which takes its toll and is very annoying; 5,378 were reared.

When the birds were ready to leave the incubator they were transferred to brooder houses of several types. One brooder house is 50 feet long, 20 feet wide, and equipped with a hot water heating system and a Brower hovering system. Another brooding unit consists of a house 10 x 80 ft. and  $6\frac{1}{2}$  ft. high at the front, and  $5\frac{1}{2}$  ft. high at the back, which is also equipped with a hot water heating system, but with hovers of homemade design, boards laid flat. Both of these houses are cut up into sections with open yards adjoining. Other brooder houses 10 ft. x 16 ft. and  $6\frac{1}{2}$  ft. high at the front and  $5\frac{1}{2}$  ft. at the rear, are divided into two sections each and equipped with either coal-burning or oil-burning brooder units. All the foregoing houses are stationary, with covered yards adjoining. Eight portable houses 8 x 10, of the usual type, were purchased from a commercial manufacturer. While all of the other houses described have concrete floors, these eight houses have floors of wood, the frames are covered with Homasote, and well painted. These houses were equipped with electric brooders and 8 electric brooders were used to replace an equal number of coal or oil-burning brooders in some of the

older houses. Two new large-sized oil-burning brooders and one coal-burning brooder, were purchased as additions to the brooding equipment. The electric brooders were of two kinds, and the cheaper kind proved to be as serviceable as the more expensive. Both types consist of a galvanized hover supported on legs, with electric heating units and adjustable regulating devices. The whole brooder is light and easily moved about for cleaning, and adapted to any style of brooding space. The brooders appear to answer all the requirements for pheasant work, except they may prove more expensive to operate.

The portable brooder houses were surrounded with open yards of wire and steel posts. A start was made on the construction of a style of "hurdle" to replace this style of portable yard. These hurdles consist of units 20 feet long, with base-board, uprights at each end, and the middle, covered with poultry netting, these sections to be assembled to make any size yard desired.

The chicks were transferred from the incubators to all these types of houses and brooded under a temperature from 90 to 100 degrees for the first two weeks. From that time on, the temperature was gradually reduced, until the heat was discontinued as far as possible, when the birds had reached 5 weeks of age.

The chicks were watered but not fed for 6 or 8 hours after being placed in the brooder units. When feeding was started they were fed first a head of lettuce for one day, being the only food supplied them. Then, five times a day, on the following ration —

First feed consisted of hard-boiled egg and Kernels (Start-All) ground up, half and half. Second feed, Purina Startena Dry Mash. Third feed, same as first feed. Fourth feed, same as second feed. Fifth feed, same as first and third feeds. The daylight period was divided into five sections, and feedings made as above. Each feed should be cleaned up in a short time, or removed. Lettuce was given every day, depending on finances. Later, all kinds of green food were given, such as buckwheat, cabbage, etc.

After three days semi-solid buttermilk was kept before them most of the time by feeding once per day on a board set on edge. After a week or ten days the dry mash was kept always before them and the first feed of Kernels, and egg reduced to two feeds instead of three, which continued thus for six weeks, but gradually reducing the egg until none was used and Spratts Pheasant Food gradually took its place, and gradually Chicgrain added in the moist food. Later a coarser grain called Intermediate Chicgrain was used, also the growing mash and coarser scratch grains were fed to maturity. There is no hard and fast rule after the birds reach six weeks of age. Considerable variation of the feed is possible as it is felt that a six-weeks-old bird is as good as raised, barring accidents and cannibalism.

Green food, consisting from time to time of lettuce, buckwheat, cabbage and other forms, along with charcoal and oyster shells, was supplied in abundance. In the operation of the incubator brooder house system, the problem of having an abundant supply of green food on hand for the birds, both old and young, at all times of the year, is great in this climate. But an abundance of green is very necessary, until such time as a satisfactory substitute can be discovered.

The old birds and the young birds from the age of 3 weeks on, were fed entirely by the hopper system.

Experiments were tried with only "Start-All" as against our regular formula, but results seemed not so good. This experiment was carefully tried out in 1929 with the same results. Also Chapple's pheasant food, which appeared to give the best of results as a substitute for Spratts, but it has not been tried from beginning to end. Further experiment would be required to draw any conclusions.

One large coal-burning brooder was run with young pheasants on a wire bottom platform which produced a poor lot of birds, but it is the superintendent's firm belief that it offers great possibilities and will be tried again next season.

Of the 5,378 birds reared 1,845 of the first hatched birds were shipped full-winged for liberation, and 3,352 were shipped to individuals and local fish and game clubs to be carried through the winter for liberation next spring as adults, and 3 albinos sent to Pennsylvania for display. There were 178 (71 cocks and 107 hens) reserved as additions to the brood stock.



Of the 395 (86 cocks and 309 hens) on hand at the beginning of the breeding season, 75 (64 cocks and 11 hens) were distributed for liberation. Ninety-two were lost (including those mentioned above destroyed by a fox), and 228 (6 cocks and 222 hens) remain on hand November 30.

**QUAIL BREEDING.** — The brood stock at the beginning of the year on December 1, 1929, consisted of 287 native Bob White quail. The food ration for the adult quail at all times from the beginning of the year throughout was as follows: clabbered milk was set before them at all times. The Larro Laying Mash was kept before them always and a mixture of Spratt's Chicgrain. Into the Chicgrain was mixed also buckwheat, wheat, oat groats and soy beans. Green stuff was planted in the pens, such as oats, Canada peas and buckwheat. Sowings were made several times during the summer. Shells and charcoal were also before them at all times.

The brood stock wintered fairly well, until, on February 15 and 16, a severe blizzard, accompanied by much snow and the lowest temperature of the year, killed 44 birds by exposure, making the total loss up to that time 66. For several weeks following, 52 other birds that had been exposed dropped off, and two were distributed for experimental breeding. On March 30, ten pairs of quail were received from W. B. Coleman, making a total of 187 on hand at the beginning of the breeding season. This brood stock consisted of 75 mated pairs and 37 extra cocks.

On or about April 25 the 75 mated pairs were placed in breeding pens 6 x 10 x 6 ft. (the 37 extra cocks being carried in lots in extra pens). The pens which held the mated pairs have a baseboard 12 inches wide, the sides covered with half-inch mesh wire for 3 ft. and remaining portion of sides with inch mesh, but top was covered with  $1\frac{1}{2}$ " mesh. At the side of each pen is placed a shelter box 30 inches x 36 inches, with a slanting roof 24 inches at the front and 12 inches at the back. A window 12 inches x 24 inches is built into the front of each box. A sliding door on the roof permits feeding the birds in the boxes. There is a shelf the full length of the back of the box 6 inches wide and 6 inches from the floor. A hole 4 x 6 inches permits the birds to run from the box out into the breeding pen, through a like hole in the baseboard. Each box is fitted with a sliding door to cover the opening through which the birds go into the pens. The shelter box is fastened to the pen by temporary fasteners so that it can be removed at any time. The pens were placed on the top and sides of a ridge, thereby giving the birds plenty of air during the hot months. Part of the ground had been plowed and cultivated before placing the pens, and about one-half the natural cover of grass, low blueberry bushes and the general floor covering of the Cape district, was used, and the cultivated areas in each pen sowed repeatedly with oats, peas and buckwheat. The advantage of this type of pen is its portability and the larger space given to the breeders. When it is necessary to move a pen and a pair of breeders (or in case a severe storm is expected) it is easy to drive the birds into the box, close the door, disconnect the pen and move it, then pick up the box with the birds, carry it to the new location, attach it to the pen, and it is all done with the least disturbance of the birds. The shelter box is constructed largely of Homasote, which makes for lightness and tightness.

Up to June 14 three hens and two cocks of the mated pairs had died of what seemed to be natural causes. On June 18 a family of six weasels destroyed 37 pairs of the breeders and 17 of the extra cocks, leaving 35 even pairs and one odd cock of the original mated pairs, and 20 of the surplus cocks to continue the season, a total of 91. The family of weasels was eventually caught in traps. It was absolutely necessary, for several days after the visitation and before the weasels were caught, to drive all the adult birds into the shelter boxes and shut them up each night and let them out again in the morning, which interrupted the laying to a substantial extent.

The total number of eggs collected was 1,956, all of which were set. Of this number 640 were placed in incubators from the beginning throughout the entire incubation period. The others were incubated under bantam hens up to the last day, and then finished off in the incubators.



The Prairie State incubator was used. The eggs were started at a temperature of  $101\frac{1}{2}$  for the first week, 102 the second week, then to 103 and carried at this temperature until the hatch was completed. The moisture pan was flooded with water during the entire incubation period. The ventilators in the machine were carried "shut" until the hatch was completed. The eggs were taken from the bantams on the twenty-second day, and placed in the incubators at a temperature of 103 with the moisture pans flooded as usual. The eggs when put in the incubator were placed in small boxes with fine wire sides and top to control the chicks until ready to be removed from the incubator.

Out of the total number of 1,956 eggs set either in the incubators or under hens, 120 were broken, 835 held dead germs or were infertile, and 1,001 hatched. In comparing the percentage of eggs hatched in incubators throughout, with those incubated for 22 days under hens, and then finished off in the incubators, it was found that the eggs incubated both in incubators and by bantams from the several individual quail varied greatly in fertility and in hatching qualities, and no accurate comparison of the two methods of hatching could be made.

When the young chicks were fully dried they were removed from the incubators and placed in electrically heated brooder boxes. These were partly of the Coleman type, the dimensions and general arrangements of which are well known by every one interested in such work.

Additional brooder boxes were built at the farm, involving much the same principle of interior arrangement and heating, but with the following changes from the Coleman type:

- (1) Whole top consists of a sliding door, up or down, instead of a heavy hinged door;
- (2) constructed of Homasote instead of boards, which is much lighter and tighter as the board top swells and warps;
- (3) front entrance door and side inspection door are both sliding instead of on hinges;
- (4) a drawer beneath to catch droppings instead of tipping the whole box;
- (5) a ventilating system on top side instead of many holes in sides of the box.

These boxes were set up on 2 x 4 frames from 18 inches to 3 feet above the ground, depending on the contour of the ground. Runs 6 feet long, 2 feet wide and 12 inches high are attached to the front of each brooder box. The floors of these runs are covered with half-inch square mesh, so that the droppings fall through to the ground, thus automatically more or less cleaning them. No provision is made to collect the droppings or to supply a platform underneath the runs which might control, to some extent, the drafts on the under part of the bird while on the run. The brooding compartment of the box is heated with a portable electric unit consisting of a galvanized cone-shaped hover 12 inches in diameter. Underneath and in the top of each is fixed a twenty-five watt heater, so suspended from the hover inside that it acts as a rest which holds the complete brooder about 3 inches above the wire floor of the box. Twenty-five of the Coleman type brooder boxes were purchased and used, together with thirty constructed at the farm with the changes indicated above. The Coleman boxes are of heavy cypress wood construction. The ones built at the farm are made largely of Homasote. The 100 brooder box supports were arranged in rows of 20 each, separated by a space or path through the middle, so that there were 10 supports on each side of the space. One hundred electrical heating units were assembled and installed at the farm for our own use, and 65 others were assembled for two of the other game farms.

As soon as well dried off, the chicks were placed in the electric brooders varying from 8 to 20 in a lot, depending on the hatch. They were fed as follows. For the first two days, clabbered milk was before them continually. Then Larro Chick Starting Mash was given them and kept before them constantly. Once a day they were fed a mixture of hard-boiled eggs ground fine, and Chapin Start-All, half egg and half Kernels. They were given only such an amount as they would eat up readily. Feeding was at noon, or any convenient time. Lettuce was given twice a day and at two weeks of age Spratts Chicgrain was kept before them at all times. This constituted their feeding ration until, at the age of six weeks, the young birds were removed from the brooder boxes and put on the ground. They were confined in lots of from 6 to 15 in the same type of pen and shelter box as

was used for the quail breeding. From that time to date they were fed the same as above, except that the Larro Starter was replaced with Larro Growing Mash and coarser grains added to the Chicgrain, such as buckwheat, wheat, soy beans, etc. Tomatoes and apples were also fed.

Of the 1,001 chicks hatched, 642 were lost and 359 reared. They did not seem to suffer from any clearly defined disease. On one occasion during the brooding period, lightning struck a transformer and shut off the heat for 5 hours. This absence of heat continued between 11 P.M. and 4 A.M., making it necessary in a rain to transfer the young quail into warm compartments underneath the pheasant eggs in the incubators. In the emergency it was impossible to avoid mixing up the lots of birds in the brooder boxes, which upset some of the records. Considerable trouble was experienced from cannibalism in all its forms, but the heaviest losses were in the younger stages of growth, mostly under ten days, which might indicate a weakness rather than disease. Cannibalism was combated by pine tar applications, covered with fine sand or road dust to prevent sticking to the feathers. This usually breaks up the habit, although it may start again and treatment must be repeated. No indications of disease were discovered, and no special treatment was given to any of the young birds, outside of that for cannibalism.

Commenting on the performance of the breeders, the superintendent says, "Our own hand-reared native stock (meaning wild trapped Massachusetts quail or the second generation from such quail) does not compare in laying qualities with the hand-reared Virginia stock, the best hen of the native stock laying 61 eggs and the poorest 14 eggs. As already noted, out of the ten pairs of Virginia quail, one hen died soon after arrival, the weasels killed 5 other hens, leaving 4 to continue the season. One Virginia hen laid 70 eggs, and died; another, 93 during the season; another, 77 during the season; another, 121 during the season, and then sat on the last ten eggs for four weeks but hatched none. Up to the time of destruction by the weasels the laying records of all the Virginia quail had been very close together. As the season advanced the eggs from the entire stock of hens showed more infertile and dead germs and the losses during the first ten days increased greatly. Some hens were found not to have laid a fertile egg during the whole season. The unusually dry season interfered greatly with the growing of green stuff for the birds, and from the last 200 eggs set, very few chicks were hatched. The adult Virginia birds are practically the same as our northern Bob White in size and color, and can not be distinguished from them. But they started to lay on an average of three weeks earlier than our native stock, and continued two weeks later in the season.

Losses among the brood stock appeared to be (aside from the losses by the blizzard, the weasels, and 3 by accident), merely the normal death rate, and no contagious disease was noted.

Of the 91 brood stock on hand June 18, 35 were lost, and 56 (32 cocks and 24 hens) remain on hand November 30.

At the close of the year there are also on hand 359 practically full-grown quail of this year's hatch.

**RUFFED GROUSE.** — As in years past, some work with the ruffed grouse was undertaken at this station in a small way. One setting of wild eggs was delivered at this station on May 5, having been sent by one of the wardens from Bridge-water where a new road was being constructed. The 13 eggs were taken from the nest about noon, and arrived about 6 P.M., and as the mother bird had been seen to have left the nest about 10 A.M., it indicated that the eggs had been without heat for 8 hours. As they hatched in 21 days, this showed that they had been incubated 2 days when taken from the nest. This is considered remarkable as it was a cold spring day and it seems the young germs surely should have died from exposure. The warden who brought them had not attempted to keep them warm in any way, as they were supposed not to have been incubated.

The eggs were placed under a bantam hen, and on May 26 all the eggs had hatched, and as soon as the chicks were well dried off they were divided into two lots thus — 8 chicks were put into a brooder box, heated with a kerosene heater and the other 5 were given to the bantam hen that hatched them.



The brooder box with the 8 chicks was placed in a covered pen 6 x 10 ft. and 6 ft. high such as is used for quail work. The young were confined in the brooder box for ten days, and then allowed the freedom of the pen. During this time the cover was lifted and kept wide open every fair day, so that all sunlight possible could enter the rather close quarters, which measured 13 inches by 16 inches exclusive of the heater.

The young birds took readily to the brooder box when allowed to roam in the pen and returned to the heat when they saw fit. On June 1 a gale of wind blew the cover off its hinges, and 2 of the chicks were found pinned beneath it. One was dead and the other was somewhat stiff and used up, and as one was found dead two days later, it may be assumed that it was the injured one. The remaining 6 birds continued to grow and thrive until maturity, and to date are in perfect health, apparently enjoying themselves in the 6 x 10 pen, roosting at night in the white pine trees, and passing the day both on the ground and in the trees.

The 5 chicks left with the bantam hen are accounted for thus, — one died on the tenth day, one on the twelfth day, and one on the fifteenth day, leaving 2 birds which grew to maturity and are apparently strong and healthy. The foster mother and the 5 young chicks were placed in the same style of pen as the other lot and had the use of a setting box usually given to bantam hens and chickens. All the conditions were practically the same for both lots, except that at times it was noticed that the hen did not always mother them as promptly as the chicks seemed to wish.

No attempt was made to discover the cause of any of the deaths, except as noted above. The feeding methods were the same for both lots. For some time the 2 birds with the bantam appeared to be somewhat smaller than the others, but later it was found that these 2 birds were both females, which generally average smaller than the cock birds.

On July 8 the first change to fresh grounds was made by placing the birds in weasel-proof pens, and the second change to new ground was made on September 12, where they have remained ever since.

At the time of the transfer of the birds to new ground on September 12, mentioned above, it was deemed advisable to unite the two bantam-reared birds with the 6 brooder-reared birds, but it proved a decided failure, as the brooder-reared birds chased and fought the newcomers until they were removed. This experience, besides the double handling, caused them to be very much wilder than the others. As in previous years, the brooder-reared birds became very tame and would alight on the attendant and feed from the hand.

The 8 birds proved to be equally divided as to sex, 4 males and 4 females, and may be readily distinguished at maturity.

During the open season on grouse, 5 birds were contributed which had been crippled, ranging from a slight wing tip to a one-legged bird that had lost its foot in a steel trap; and 3 had their wings broken next to the body (one of them had, in addition, been bitten by a dog). Three birds still survive, and will be used to cross breed with the hand-reared birds. It is rather difficult to get the required food for crippled grouse, as they must have natural food for some time and be worked gradually on to a more artificial food, and even then a certain amount of their ration must consist of green food of a natural type. These foods should include bayberries, barberries, thorn apples, chokeberries, berries of bull briars, rose hips, checkerberries, and leaves, as well as leaves of the dye bush, laurels and numerous kinds of buds. Any or all of these will be eaten readily by the wild grouse.

The feeding methods for both lots of young grouse were the same, and closely resembled the feeding of young pheasants, with the exception that every available insect was given them, ranging from grasshoppers, crickets, June bugs and other beetles (these were broken up), flies, etc. A chick starting mash was kept before them from the beginning, no particular brand, sometimes Larro, sometimes Purina, and other times Wirthmore Kernels, changing on to growing mash as the birds became older, and continuing up to date. Twice a day a moist mash consisting of either of the above, mixed fifty-fifty with hard-boiled eggs, was allowed



them, which was supposed to be eaten up in half an hour. The egg appeared to be their favorite meal. A fresh head of lettuce was given them every day, but at the beginning, leaves of same were cut fine and mixed with the egg food, and also placed in their water dish to keep from wilting. This simple diet seemed to satisfy them, and they appeared to grow naturally and feather out quickly. As soon as blueberries were ripe, they were kept before the birds at all times as long as they were in season. Strawberries somewhat mashed were used as soon as the birds were a few days old. As the season advanced, wild cherries were substituted in place of the blueberries. Then chokeberries, viburnum, and bayberries and barberries took their place. Later, buds were enjoyed at times. The egg was discontinued at 8 weeks, although after maturity they still enjoyed a meal of it once in a while. Spinach is used for a green food during cold weather, but is not so well liked as lettuce. A coarse, leafy growth seems as good as a more tender one for mature birds. Some years ago, in connection with experimental grouse work, a covered yard was built over a matted growth of trailing arbutus, with the result that they completely annihilated it, young and old leaves alike. As they completed their growth, some buckwheat, oats and whole corn was fed, as well as acorns in season, besides grapes, both wild and cultivated.

The year closes with 8 grouse reared from the egg, and 3 received wounded, on hand.

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The superintendent speaks of his past experiences in rearing ruffed grouse in a reminiscent way, as follows —

As we look back eighteen years to our first attempt at rearing these noble birds during the summer of 1912, while with the American Game Protective Association at South Carver, Mass., it is realized that little progress has been made during that period. True it is that these experiments have not been continuous, year after year, not from lack of interest or material to work with, but mostly from want of time to carry on such work in connection with the other game bird rearing.

To resume, at the end of the seasons of 1912 and 1913 when we left South Carver to take up the same line of work with the Board of Commissioners on Fisheries and Game for Massachusetts, there remained 19 hand-reared grouse, some of which were of the second generation. Most of these birds had been raised from wild eggs taken from nests which we were able to find after many hours of very diligent hunting, carried on in a systematic way and sometimes by the use of a setter dog. Only one nest was purchased from an outside party during the two seasons. Without going too much into detail at this time, it should be mentioned that the outstanding flock of 6 birds had as mascots and constant companions 3 black bantam chickens, until these were barred from the farm as possible "germ carriers".

During the seasons of 1914, 1915 and 1916 at East Sandwich, experiments were carried on with wild eggs furnished by the wardens, with rather indifferent success. This work was discontinued, and the 17 hand-reared birds then on hand were ordered to be released.

From that time on, with the exception of 1917, 1918, 1919, 1923 and 1927, it happened that a clutch of eggs was forthcoming every season and set under a bantam, simply out of personal interest.

In 1920 one bird was reared to maturity from a clutch of 8 eggs, to be killed by a fox gnawing through the wire pen in the winter.

In 1921 no eggs hatched from 11 deserted eggs found by a neighbor.

In 1922 eight eggs were taken from a nest, and bantam eggs stained brown were substituted. No young were reared, but most of the bantam eggs were hatched by the mother partridge and the young cared for, as several were started near there in the early fall.

In 1924, twelve eggs found after a woods fire proved to be spoiled.

In 1925, eight eggs found at a woods fire all hatched, but none were reared.

In 1926, ten eggs received from a friend in Wareham, taken at a woods fire and placed at once under a hen, all hatched, and 6 were raised nearly to maturity,

when a trouble resembling roup of the domestic fowl killed 4. The eyes of these birds swelled to the extent that no food could be taken into the mouth. The other two birds matured and lived for two seasons, and died. These were both males.

During the extremely rainy June and July of 1928, out of nine eggs purchased, three females were reared by a black bantam hen; and from June 18 of that year when hatched, to the following April 20, a period of 10 months, these three grouse and the bantam hen occupied the same area in a covered pen 6 x 10 ft. and no droppings were ever cleaned out or the ground spaded up. On April 20 the three females were removed to a more roomy yard, 12 x 80 ft., and the Director of the Division purchased 2 cock birds from Alberta to mate with them. After six days on the road they arrived in bad shape, one dying the next day. The other braced up and lived until the early fall of that season. On May 2 the first egg was laid, and 35 eggs were collected during the season. One hen laid 10, another 11, and the third 12 eggs, and later, one laid a second litter of 2 eggs on which she sat. The eggs were removed from two of the birds, hoping that a good second litter would result, but one of them laid none, and the other only two as stated above. The remaining hen was allowed to sit for some time to play with, as she was very tame and interesting, but later nine pheasant eggs were substituted for her own eggs, and 8 young pheasants were hatched. All of the grouse eggs proved to be infertile as the cock bird from Alberta had not mated with the hens. As soon as the grouse with the 8 young pheasants began to move about the yard, the hen that was sitting on 2 eggs immediately left her nest and joined in with her sister in caring for the young pheasants, so that it was impossible to know which hatched them, and some were mothered by one and some by the other hen. Seven good birds were reared to maturity, and it was a very interesting sight to see this group of full grown pheasants feeding from the same dish as the grouse, and roosting on the trees, oftentimes side by side with them. In February of 1929 a weasel (which was caught later) entered the pen through an abandoned rat hole and killed these three grouse.

In 1929 a setting of 11 eggs was purchased in May, and all hatched but none were brought to maturity as all died during the first two weeks. Our only alibi was lack of time to care for them properly.

During these eighteen years of rather sad experience with the ruffed grouse, quite a number of injured birds have been forwarded here to keep, but without exception they have all died, having been hurt too badly to survive. These do not include wing-tipped birds shot by hunters, which under the best conditions do survive. During the first year some were trapped, and at one time a large, long-handled dip net was constructed for Warden William H. Leonard on a special occasion for him to dip a certain "very large and intelligent-eyed female" as he expressed it, which was sitting on 13 eggs over in Waquoit. He did the trick, and returned with both the eggs and the hen grouse, and the next season she laid 13 more eggs and also a second litter of 2 eggs. Only one of the eggs was fertile. There seems no great difficulty in getting wild crippled birds to lay the following season in captivity, allowing they have a roomy pen which grows a considerable amount of natural leafy food in connection with the artificial feed given them.

The greatest trouble is in getting the birds to mate, which is very strange when we know how easily the quail and pheasants choose their mates. We have had two hen grouse (sisters) with a cock bird in a pen for several months, with the result that when the laying season arrived, while both hens laid in the same nest a total of 19 eggs, none of them held a fertile germ. Two other sisters mated with a cock bird laying in two separate nests, 10 and 11 eggs, respectively, had fertile eggs so that some hatched from both lots of eggs. It seems safe to say that over 60 per cent of grouse eggs laid in captivity proved to be infertile.

In summarizing, we would say that ruffed grouse can be reared successfully in captivity, but as the number of eggs are limited practically to one litter of possibly ten eggs on an average, it can be readily seen that progress must be slow because of a shortage of eggs with which to do business as compared to the quail and pheasant breeding, where an average of 40 or 50 eggs per season may be obtained. And as there is much difficulty in getting the eggs fertilized properly, because of non-mating of the sexes, a further handicap is added to lessen the possibilities.



However, time and patience may work out some way to overcome these drawbacks, which nature has provided to the grouse family, so that future experimenters will be rewarded.

Much time is required with the young birds as they are very backward in eating, and take no notice of the call of the foster parent who loses her patience at last, and swallows the choice insect that was intended for the chick. After a couple of weeks this is overcome.

Eggs from the wild birds taken under natural conditions nearly all hatch, and the young from these eggs appear to be much stronger and better able to live and thrive under artificial conditions. We have never attempted to figure out the cause of any deaths other than by accidents and vermin, for the simple reason we do not know how. But, while we are fully mindful of diseases and parasites as most carefully explained in the numerous treatises and poultry magazines, etc., we yet believe there is more to it than simply these troubles. We have never attempted to utilize wire cloth to rear them on, but will certainly do it when the occasion requires. But if I were a young grouse, with thousands of generations before me that had trod mother earth as nature had intended, I most certainly would rebel to the extent that death would be my choice when confronted with one of those new-fangled wire-bottomed coops. And yet we use the most modern of this kind on which to raise quail.

In line with the above paragraph, mention was made previously of three grouse and their bantam hen being kept for ten months on a plot of ground 6 x 10 ft. square, and no droppings removed nor the ground spaded up. This was premeditated, to see if these dreaded disease germs or intestinal parasites would rise in their might and claim their victims, but as they did not do so, we must conclude that the black bantam hen was not a germ carrier or that our Cape Cod air does not encourage the spontaneous generation of such "varmints." In other words, we honestly believe that the disease and parasite scare is carried too far. While at times we think very seriously and feel most discouraged, because of the possible serious result which could happen to our whole game rearing project, including pheasants, quail and others, from these troubles if they were as bad as we are led to believe, we are heartened by the fact that many of our pheasant rearing yards and brooder houses have been used continuously for that work for eight or ten years, and yet continue to produce first quality birds and in goodly numbers.

### *Marshfield Game Farm*

**NEW CONSTRUCTION.** — The larger brooder house was completely remodelled. Additional supports and new sills were placed under the entire house, additional studding and framework inserted, and the whole house squared up on its foundations. Nineteen windows were inserted along the back to supply additional light, ventilation and openings through which to throw out refuse when cleaning the house. Most of the floor was replaced and additional concrete work put under the sills along the front as further protection against vermin.

The water system was revamped, and running water brought into all the sections of the house with automatic watering pans. The house was rewired for additional light. Some of the framework of the pens adjoining the house was replaced and much new wire substituted for that which had rusted out.

Twenty-five quail breeding pens 10 x 5 and 5 ft. high, sides and top partly boarded in, were constructed. These pens were covered with half-inch mesh wire, and late in the season made weasel-proof by nailing a strip of two and one-half inch mesh wire 2 ft. wide to the bottom of each pen, then burying this wire in the ground. These were later equipped with fronts to the board part, including a window and wooden floor and slides operated with pulley and rope to let the quail in and out. The door at the back was rearranged. All this to winter birds in these pens.

Forty-two quail brooder boxes of the Coleman type equipped with electric heaters, and 6-foot, wire-bottomed runs, were installed on supports above the ground.

A new meter was installed in the camp, and also a system of lights and automatic signals to notify the superintendent in case the power was interrupted.



A new power meter was installed in the incubator cellar to operate the Petersime all-electric machine.

A start was made on a guard fence by setting up the posts from the barn along that portion of the farm to the north which borders on the State road. The compression tank and motor which formerly supplied the water from a well on the premises was set aside as an emergency unit, and the farm's water system was connected direct with the town water supply. Additional piping was carried into 18 yards in front of the houses-on-the-hill unit (5 in front and 13 back) to supply sprays of running water. The brooder houses on the top of the hill were repaired.

All the buildings, with the exception of the barn, were repainted.

The trout rearing pond was dug out, the banks filled in and graded, racks and screens were placed at the inlet and outlet, and a concrete flume built at inlet.

A band saw was added to the equipment.

The superintendent, at his own expense, in his own buildings (save for a small amount of repairs made by the Division), is taking care of a large amount of lumber sent to the farm.

No trees were set out, but there were transplanted about 300 small trees and privet, all ready to put in permanent places as soon as the ground is ready for them in the spring.

NEW EQUIPMENT. — A Ford one and one-half ton truck and a Petersime No. 5, all-electric incubator were purchased.

PHEASANT BREEDING. — The stock on hand December 1, 1929, consisted of 36 birds carried over from the 1929 hatch, and 441 of the 1929 brood stock, or a total of 477 birds. They were carried, wing-clipped, through the winter in a combination swamp and upland uncovered yard. In this yard were various shelters made by piling grass on top of frames and heavy brush. A spring-fed brook running through the yard supplied the water. During the period from December 1 to the time they were put into the breeding pens the birds were fed twice daily with Wirthmore Scratch Feed. During the last two months before being placed in breeding pens they were fed Larro Laying Mash in hoppers of the superintendent's own make, placed in wooded parts of the yard.

Up to the early part of April, 23 birds had been lost or escaped, 25 (9 cocks and 16 hens) were distributed for liberation, 420 (70 cocks and 350 hens) were caught up and placed in the breeding pens in the ratio of 5 hens to 1 cock, and 9 surplus wing-clipped cocks were held for later distribution. The breeding pens are of the usual type, 10 x 10 x 5 and located permanently on a section of upland adjoining the winter quarters. These pens had all been limed and sanded in the early winter and allowed to lie until ready for the stock in the spring. The breeders were supplied with Larro Laying Mash and Wirthmore Scratch Feed in hoppers, which were refilled twice a week. These were seven-compartment hoppers holding Wirthmore Scratch Feed, Larro Laying Mash and Protox Beef Scraps. Charcoal, ground oyster shell and coarse gravel were available at all times. Buttermilk Condensolac was fed twice a week on a board nailed to the frame of the yard. After the laying period was over, the birds were changed to large covered pens in which was fresh, running water. They were fed from hoppers the same feed, except that the laying mash was left out.

From the time the birds were placed in the breeding pens, chopped green rye was fed once a day. This was the green ration throughout the laying period. After the close of the laying period up to the end of November there was plenty of green food in the yards, except for the last two months, when cabbage was supplied to them.

The birds while in the breeding pens were given clean water twice a day, and on hot days, three times. Straw was put in the corners of the breeding pens, but they did not make their nests in it to any extent. New shelters consisting of a frame of two by four and tarred paper, placed two and one-half feet above the ground, were put in to serve as protection for the self-feeders and for the birds in rainy weather.

The first egg was seen on April 2. From that time on they were gathered every night, stored in a cool section of the incubator cellar, and held for forty-eight

hours. There were 15,066 eggs collected, of which 87 were used for feeding birds, 20 distributed for experimental purposes, and 14,959 set.

The eggs were turned once a day during this period. The first eggs were set in Prairie State incubators (the only incubators ever used at this farm) until the arrival of a Petersime, referred to later. The incubators were started at a temperature of  $101\frac{1}{2}$  degrees and gradually increased to 103 at or about the fourteenth day. After the first forty-eight hours in the incubator the eggs were turned twice daily by hand and cooled once a day. The cooling period depended on the temperature of the cellar, and was extended as the animal heat in the eggs increased. At no time were the eggs sprinkled. Moisture was supplied from the large pans in the bottom of the machine. These were lightly covered with sand, filled with water, and kept full all through the hatch until the first eggs pipped. When the time came to close the incubators up on the twenty-first or twenty-second day, these moisture pans were removed and frames covered with burlap inserted in their places, upon which the young birds could rest when dropping down into this compartment from the egg trays. The ventilators were run wide open until the moisture was removed and the machines were closed up on the twenty-first or twenty-second day for the remaining period of the hatch. Each lot of eggs in the incubators was tested on the tenth and sixteenth days.

On May 15 a No. 5 all-electric Petersime incubator was installed and put to work. At the beginning it was run at a temperature varying between 99 and 101, the moisture pan supplying the moisture. Some of the comments on the operation of this incubator will appear in the following account of the incubation of quail eggs at this farm. Various tests were put on the machine before it was found that, while it would incubate the eggs satisfactorily up to a given point, it could not be used to finish the hatch. As a result, various lots of eggs were taken from it to finish off in the Prairie State incubators, and after tests it was found the transfer should be made on the eighteenth day. The Petersime ran very smoothly and was a labor-saver in that it permitted the automatic turning of the eggs. There was no cooling of the eggs incubated in this machine. The time between the hatching of the first eggs to the time the chicks were ready to come out of the Prairie State incubators was 36 hours.

Of the 14,959 eggs set, 6,465 were infertile in incubators, contained dead germ, or were otherwise lost, and 8,494 hatched. Of these, 3,564 were lost, and 4,930 reared.

As soon as the chicks were ready to be taken from the incubators they were removed in a wool-lined basket to the small brooder house in which there are 18 sections 5 x 10 ft. In addition, on the southerly side of the house each compartment has an additional space 5 x  $6\frac{1}{2}$  in which transoms in the roof and windows at the front permit of abundant sunlight, which, by opening the windows, can strike directly on the birds. In front of this is a covered pen section 5 x  $6\frac{1}{2}$  that gives the birds opportunity to get into the air. The sun parlor extension and the open pen are covered with concrete floors, which are covered with sand and fine-cut straw. This material is removed and the sections thoroughly cleaned as the birds are shifted. The brooder house had been thoroughly renovated, painted throughout, and made ready. The house is heated with a hot water system and the heating pipes covered with brooders designed by the superintendent. The temperature of 90 was maintained under the brooders at all times. As soon as a lot of birds was put into a section they were fed with a head of lettuce, given clean, lukewarm water and a mixture of hard-boiled eggs (eggs boiled 30 minutes, cooled, shelled and put through a potato ricer) and Spratt's No. 12 Pheasant Meal, scalded and cooled, — about one-half egg and one-half meal. They were given this ration six times daily for the first ten days, and at each feeding on clean boards, enough so that they would clean it up in about fifteen minutes. The feeding boards were then removed and cleaned after each feeding. A chunk of semi-solid buttermilk or Condensolac was smeared against an upright board, high enough from the ground so that the chicks could reach it but were obliged to work to pick it off. Electric lights were kept burning all night to help them find feed and water when needed, and to keep them from huddling.



Larro Starting Mash was kept before the birds in self-feeders at all times, and charcoal and oyster shells in small hoppers in the sand of the sunny extension. The chicks were kept close to the brooders during the first day, and thereafter were allowed into the "sun room." The weather being favorable, they were allowed to run into the outside yards after the third day.

On the tenth day they were taken to the big brooder house, which also has a hot water system and brooders, laid out the same as the small brooder house, only on a larger scale. This house had been completely remodelled, with windows placed along the north side to supply light and openings for the removal of debris. It has a wooden floor, raised above the ground in order to be able to fight any vermin which may appear. This house has a boiler room at one end. The remainder is divided into 19 sections 10 x 15 ft. with covered yards adjoining. These yards are 20 x 80 ft. divided into two parts, 20 x 40 each. A concrete ramp from the floor to the level of the outside pens provides runways for the birds. Water is supplied in this house at all times in automatic water pans. Here also electric lights were kept going at night to keep the birds from huddling, and so that they could find feed and water when moving about at night. The covered yard opposite each section is 20 x 40 ft. and has sun breaks to protect the young birds during the summer period. A solid wooden partition divides this house in the middle. At this point there is a valve in the water system which permits cutting down the heat in the remaining half of the house. An automatic valve supplies water to the boiler at all times.

The young birds were started in this house at a temperature of 85 degrees under the brooders. The floor was covered with sand and fine straw. The same food ration was continued, only that the egg content was cut down to about 30 per cent. The mash kept before them was changed to half Larro Starting Mash and half Larro Grow-All Mash and kept always before the birds, in hoppers, together with semi-solid buttermilk, oyster shell and charcoal. Green food was provided daily in such abundance as conditions would permit. The drought throughout the summer made this an expensive part of the feeding. Part of the time they were fed poultry cabbage grown on the premises, and during the rest of the period, on lettuce. After two weeks Spratt's Chicgrain was added to the foods listed above, fed in hoppers. From that time on the egg content was gradually lowered, Chapin's Grow-All Kernels substituted, and the Larro Growing Mash substituted entirely for the Larro Starting Mash. This reduction in the egg content progressed to where it consisted of 20 per cent of the mixture, when the birds were from four to five weeks old.

Every few days the birds were culled over as to size and general growth. Taking both the small and large brooder houses together, the plan was to cull over the birds every few days and to transfer the most advanced birds from the small brooder house to the larger compartments in the large brooder house, with the temperature reduced to 85 degrees. In the large brooder house when they reached the required development, they were advanced into the second house where the temperature was reduced still further, and where, with open windows, they were taken from this house and put into brooder houses and yards on a higher elevation. This unit consists of four houses 10 x 20, with one Simplex oil-burning brooder stove to a house, and one house without heat. There is hardly ever heat in the last three houses. There are 5 covered yards in front of the houses. The birds were run in these houses and yards for a short period with heat supplied only on cold, wet days and nights. After additional "seasoning" they were again graded and put into the thirteen covered yards back of these houses, with only open shelters for cover, made from a framework covered with fresh cut rye with the grain in the heads. This provided some additional food, as well as shelter. The birds were thus reared without heat until they were from six to eight weeks of age (depending on the rapidity of their development), when they were wing-clipped and put into one of the open yards for field rearing. They were caught up every ten days to two weeks and clipped, and at the age of twelve weeks or older, the quills on the clipped wing were pulled and the birds shipped to individuals or clubs to be carried through the winter and liberated in the spring as adult birds. In the rearing fields they were fed Larro Growing Mash and



Wirthmore Scratch Feed in self-feeders. From this time on, no green food was fed them, for there was sufficient in the rearing fields. The only exception is, that a portion of the six to eight weeks old birds, after they had gone through the hardening process, were carried in large covered yards up to the age of twelve weeks for liberation instead of being placed on range in the fields. That portion of the birds so reared were fed on the same plan as detailed above, except they had to be supplied with a portion of the green food requirements to supplement that which had grown up in these covered pens before the birds were put into them. In each of these pens, clean water is supplied by automatic watering dishes.

Of the 4,930 young pheasants reared, 375 were distributed for liberation, 4,525 were distributed for wintering, and 30 are on hand November 30.

Of the 429 adults on hand at the beginning of the laying season, 12 were lost and 417 (79 cocks and 338 hens) remain on hand November 30.

QUAIL BREEDING. — The breeding of quail was resumed after a lapse of years. In 1918 Superintendent Sherman trapped 44 wild quail, from which he produced and liberated 107 young. Bantam hens were used to hatch the eggs and rear the young. This was in the early days of our work with the incubator-brooder system for ducks, and we deemed it advisable to concentrate on duck production until sufficient numbers were being produced to carry most of the overhead cost of operation, and not continue the work with the quail.

On March 26 of the present year 15 pairs of quail were received from the Virginia State Game Farm, of which J. C. Wall is superintendent, and on April 1 twenty pairs were received from the White Oak Quail Farm, Richmond, Virginia, of which W. B. Coleman is superintendent, making a total of 35 pairs. There were 20 pairs intended for breeding stock, and 15 pairs for liberation. Both lots of birds arrived during a spell of extremely cold, wet and windy weather. All the quail were placed in the small brooder house and split up into small lots, each being confined in a space 20 x 6½ feet. They occupied only a portion of the depth of the brooder house and had available a run into the "sun room," which is a projection on the southerly side of the brooder house proper. The roof and the front of this portion of the brood house has glass windows which may be opened or closed to regulate the temperature. Small cedar trees were placed against the wall and the floor was covered with fine straw. The small yards in front of each compartment were covered with clean, coarse sand. When this sand was renewed each week the concrete flooring of the yard was thoroughly scraped and flushed clean before the new layer of sand was put on.

Twenty-five quail breeding pens 10 x 5 x 5 ft. were constructed, of the type generally used in the quail work throughout the country. About 4 ft. of this pen is boxed in with a sloping roof and sides of Homasote. In the back there is an 18 x 12-inch hinged door made of boards. That portion in the nature of a yard has an 18-inch baseboard. The sides of the pen are covered with half-inch mesh wire, and the top of the pens are now (since our experience with the weasels) covered with half-inch mesh. In the covered part of the pen were placed platforms about two inches off the ground, covered with half-inch mesh wire on which the hoppers containing the feed for the birds and the clabber were placed. Each pen was supplied with small shelters designed to encourage the birds to nest under them. These shelters were 18 inches long, 18 inches wide, and 18 inches high, with pitched roofs and made from the ends of the Homasote boards used in building the shed parts of the pens. These shelters had openings the full width of each end, 6 inches high, in order to avoid any appearance of confining the birds. Inside each shelter was placed some straw as a further encouragement to the birds to use these nests or shelters. It was noted that the breeders remained under these shelters to a considerable extent during heavy rains. The pens were set on ordinary sod. Clover planted was soon cleaned up. No other shelter or hiding space was provided.

On April 20 one pair of birds was placed in each of 20 pens, a cock from the Virginia State Game Farm being mated with a hen from the White Oak Quail Farm, or *vice versa*. Of the remaining pairs of quail, 10 pairs were exchanged for an equal number of the Bob Whites on hand at the wild life sanctuary operated by Phillips Academy, Andover, Mass., because some of the birds received were

wing-clipped, and the sanctuary birds were full winged. The 10 pairs received by this exchange and the five pairs remaining of the original shipments, or a total of 15 pairs, were liberated on Nantucket on April 22 by Superintendent Sherman in person, thus accounting for the thirty-five pairs of quail received. Ten pairs of the liberated birds were those purchased with money donated by S. W. Carey, Jr., mentioned under Acknowledgments. The remainder were paid for with divisional funds.

The breeders were fed and supplied with clabber and a head of lettuce every other day, the feeding starting at 1 P.M. The hopper was supplied with cow peas, soy beans, wheat, millet, kaffir corn and buckwheat. Clabber was supplied in glass dishes which were replaced with clean glass dishes at each feeding time. This was the only combination of feeds used, mash having been tried on the birds at the beginning but discarded, for they would not notice it. A mixture of charcoal and oyster shells in metal containers was kept before the birds constantly.

Seventeen of the hens made their nests under the shelters, one built its nest outside, and two did not lay at all. The breeding pens were numbered, in order to keep track of the eggs collected.

Superintendent Sherman reports that it was common for the quail to perch on the ridge of the shelter or laying box, which, being as high as the top of the base-board, enabled the birds to look around. He would have liked to place a stump in each pen "that would have been twice as high as this shelter, because 'Bob' always likes to sit on a stone wall or a fence and whistle while 'Mrs. Bob' is laying or sitting."

The first eggs were observed on May 4. The eggs were gathered every Friday at feeding time. Three hens were lost by disease diagnosed by Dr. E. E. Tyzzer of the Harvard Medical School, as blackhead, and two hens did not lay at all, which gave but fifteen pairs of producers. Later, 2 more hens were lost. Up to the 27th of June, 547 eggs (including the 63 eggs in the nest on that day which were immediately removed) had been collected. All the breeding pens were located in an old orchard surrounded by a guard fence. But the location was visited by a family of weasels on the above date, which killed 17 cocks and 13 hens, all of the remaining brood stock except 3 cocks and 2 hens. During the four days following this visitation, five weasels were trapped, and thereafter no more appeared. One hen died within a short time, and sufficient eggs were laid by the remaining hen to bring the total number of eggs for the season to 583. One cock was sent to the Ayer Game Farm to replace a cock that had been lost.

When collecting the eggs the number of the pen was taken and the eggs marked, in order to keep track of the fertility of the eggs from each pair. Less than half the total number of eggs in the nest was collected. For example, if there were 9 eggs, 3 would be taken, leaving 6. In each case the darkest or oldest looking eggs were taken, leaving the whitest ones. At the time of collection a record was made not only of the eggs taken, but the number of eggs left in the nest, so that at the end of each collection period the superintendent knew how many eggs were actually on hand. It is considered highly desirable to leave at least 4 eggs in the nest, otherwise the hen may be driven to relocate her nest out from under the shelter box, and it may also result in a temporary interruption of the laying. The eggs were deposited in a pan filled with cotton wool as they were collected, and upon being brought to the incubator cellar were placed in small wire holders made from half-inch mesh wire, 5 strands wide, the length of the egg tray in the incubator. The piece of half-inch mesh wire was bent through the middle, making a V-shaped trough and soldered at each end to stiffen it and help hold in the eggs. The eggs were inverted point down, and any open space between the last egg and the end of the tray was filled up with cotton wool to keep the eggs firmly in place. All eggs were held for about 48 hours after collecting, before being placed in the incubators. They were carried in the trays in a cool place with a temperature of from 50 to 60 degrees. The holders were turned from one side to the other, morning and night, thus shifting the position of the egg twice daily.

The 583 eggs collected were set in incubators. Both the kerosene lamp-burning Prairie State incubator and the No. 5, all-electric Petersime incubator, were used in the hatching of quail eggs. Most of the time the quail eggs were sandwiched



in with pheasant eggs, but the quail continuing to lay after the period of collecting pheasant eggs, there was one occasion when only a limited number of quail eggs was hatched alone in an incubator. It is considered desirable to have the incubator as well filled with eggs as possible, to best balance the machine. On the other hand, an unusual hatch was made in a 390-hen-egg Prairie State incubator which holds, by actual count, 625 pheasant eggs. Fifty-one quail eggs, using the holders described above, were placed in such an incubator without any other eggs. These eggs were turned daily by shifting the holder as previously described. They were not touched by the hands of the superintendent until the nineteenth day, when they were picked out of the holders and placed in a wire basket known as the "Pedigree Hatching Basket." Fifty-one snappy quail were hatched. From the time the first chick came out until the end of the hatch was just three hours. The temperature of this machine was  $101\frac{1}{2}$  degrees when the eggs were put in, and it was not allowed to go above 103 at hatching time. The humidity was around 60 (by one of the so-called humidity glasses, in which the superintendent has little confidence) and the ventilators to the machine were kept "wide open" from start of the hatch to the day the eggs pipped. Then the machine was closed tight until the chicks were taken out. No water was sprinkled on these eggs, but the full sized moisture pan under the egg tray (which is a feature of this machine) was kept brimming full from the start of the hatch and was left in until the hatch was all over. The chicks being confined in the basket, there was no chance for them to get drowned. All other quail eggs were hatched on this same formula, except that they were set with the batches of pheasant eggs. In operating the Petersime all-electric machine, such pheasant and quail eggs as were set in it were carried until the nineteenth day, when they were transferred to Prairie States to finish the hatch. It did not seem possible to supply a sufficient degree of heat and volume of humidity to get the desired results in completing the hatch in the Petersime machine. This refers to pheasant as well as quail eggs. Less cripples were found in the eggs kept in the Prairie States throughout the entire hatch than in the eggs incubated mostly in the Petersime.

Of the 583 eggs set, 186 were either infertile or produced crippled birds that were destroyed, and 397 normal chicks hatched. The chicks were taken from the incubators to the small brooder house where one brooder compartment had been divided into three sections with straw-covered floor where the temperature was carried as for pheasants — at 90 degrees. About 25 birds were placed in each section and carried there for a week, and then transferred to the Coleman type brooder boxes. This type of quail brooding box, with its electric heating unit, is so well known among those interested in quail breeding as to require no detailed description here. In front of this box is a wire bottomed and sided run, 6 feet long, originally designed by Mr. Coleman. The superintendents constructed their own runs, and each man made some changes of his own. At the Marshfield Game Farm the runs were 6 feet long, 18 inches wide and 18 inches high and a six-inch baseboard on the three sides (the end next to the box not being wired). The frames were made of seven-eighths inch boards 2 inches wide, and the sides of the run on the end next to the brooder boxes were boarded up for two feet. The remaining portion of the sides, the end and the top, were covered with copper mosquito cloth. Two small doors on the side of the pen were set in for feeding in the run and a slide on top 2 feet long was provided to put in and take out boards. The floors were covered with a small square mesh wire. It is recommended that one-quarter inch mesh wire or smaller, if possible, be used, for considerable trouble was experienced with small birds catching their toes in the wire and becoming crippled. A two inch strip, flush with the bottom, was built into the run, and the wire drawn over it, leaving about 4 inches for the droppings to fall through on to the floor of the frame on which the boxes and runs were set.

These brooding units were placed on frames 6 feet 2 inches in length, made from 2 x 4 spruce 18 inches wide. A floor was built on 6 feet of the frame to make the bottom to catch the droppings from the runs. This frame was about 4 feet from the ground. The runs were fastened to the frames with galvanized hinges so that they could be turned back and the permanent floor on the frame cleaned and washed. Canvas covers were made for the runs, extending the full length of the



top and 6 inches down each side and over the entire end. This seemed to work satisfactorily for it made a good windbreak, rain-protector and gave the superintendent an opportunity to regulate the amount of sun to let in on the birds in the runs at all times.

In transferring the young quail from the sections in the small brooder house, 12 were placed in each brooder box. At the beginning the birds were fed on fresh boiled eggs (boiled 30 minutes, all shell removed and the egg put through a potato ricer). The egg was added to Spratt's No. 12 Pheasant Meal, thoroughly scalded one-half hour before feeding, and cooled. At the start the ration was about half egg and half meal. The percentage of egg was gradually cut down as the birds increased in age, so that at the age of 6 weeks, 25 per cent of the total bulk of food consisted of egg. The egg content has been continued in the feeding of the birds up to the present, although now only a small percentage of egg is added to the Spratt's Meal. The young birds were fed three times daily up to the age of 8 weeks, and from that time on the feedings were cut down to where they are now fed this mixture once a day. Fresh clabber was given with each feeding, and fresh lettuce was kept before the birds throughout the day. This mixture was fed on a clean board 8 inches wide and 16 inches long. This was so manipulated that at each feeding the birds had a clean surface. From the time they were two weeks old they had Spratt's Chicgrain before them in small hoppers at all times. In connection with that stage in the handling of the chicks where they were placed in compartments of the small brooder house, Superintendent Sherman reports, "In removing the quail from incubator to brooder compartments in the small brooder house, I had prepared a small part of the pen with fine sand, covering the floor on which they are allowed to run. After the first two hatches this was discontinued as I found they ate too freely of it and it formed a 'sand clog' at the vent. The only grit that I fed was after they were two weeks old, a pinch of sharp, clean sand placed on the board with the feed." He further reports, "Not once through the whole rearing period of quail have I experienced any cannibalism, toe picking, vent picking, or bill picking, in the young birds. This I lay wholly to the feeding three times a day, and keeping fresh clabber and green stuff before them constantly. I find, in my experience in raising quail in incubators, one has got to practically live with them day and night for success. I had a regular time each night for closing, and they were let out at a regular hour in the morning. I found they respond to routine treatment very quickly. By filling these little fellows up as soon as they got up and then giving them plenty of fresh lettuce to work on, as soon as they were fed, cannibalism was averted."

Owing to the lack of sufficient equipment and help, it was not possible to get the open air yards for the birds ready to transfer them from the brooding units at six weeks of age. As a result, there was some fighting among the birds as some of them had to be held in the brooder boxes and runs to two months of age, or older. It appears that the birds should be immediately removed from the runs, getting them off the wire and on to the ground promptly when they are six weeks old.

Of the 397 normal chicks that hatched, 94 were lost and 303 reared. These birds will be carried through the winter, and those not reserved as brood stock will be liberated next spring before the breeding season but after the menace of winter kill has passed. They are being carried in the breeding pens, which have been revamped for the purpose by placing a wooden floor in the covered section, and setting in place a movable front that completely boxes in the covered end. This front is supplied with a glass window  $2\frac{1}{2}$  ft. x  $2\frac{1}{2}$  ft., 6 lights. In one corner there is an opening 6 x 8 inches with pulley and rope to open and close for the quail to come out into the open portion of the pen. The floor of the boxed-in portion is covered with a litter of clean straw and the clabber dish and hopper are placed on a wire platform which helps to save feed and to insure sanitary conditions. A door 18 in. x 2 ft. has been fitted to the box, making it easier to take care of the birds. The open portion of the pen has been covered with a 4 to 6 inch layer of clean sand. They, as well as the adult birds, are being fed clabber and the Chicgrain described above. The young birds are given one feed daily at noon, made up of the Spratt's No. 12 Pheasant Meal, with a small percentage of hard-boiled

egg. So far each night the birds have been shut up in the covered section, but left to their own devices during the day. However, it is noticeable that they spend a great deal of the daytime inside the covered section, sunning themselves in the straw inside the window. It is the superintendent's intention to shut up the birds each night during the winter as a guarantee against losses through the heavy snows and sleet storms of our northern winters. In commenting on the year's work, Superintendent Sherman observes, "One must be punctual with feed, clean above all things, and willing to work all hours, for success in breeding quail."

At the close of the year there are on hand, 303 practically full-grown quail, together with 3 of the adults (2 cocks and 1 hen) that survived the attack of the weasels.

### *Wilbraham Game Farm*

NEW CONSTRUCTION. — Wire was put on 9,000 feet of guard fence, for which posts and baseboards had been set up in 1929.

The portable fences were moved from the orchard to the brail yard. When these were set up it made four pens 250 x 100 ft. each, in which the young pheasants were held from the time they were taken from the brooders at the age of six weeks until they were distributed.

The vegetable garden was enclosed with a portable fence, to be used this winter as a holding pen for the brood stock.

Forty quail breeding cages were built, 20 of the old type, 10 of the Torrey type, and 10 of the wintering pens 3 ft. in height. Forty shelter boxes were built to go with the above 40 quail cages.

Twenty-six Coleman quail brooder coops were purchased, together with 26 electric heating units. Stands were built, and 26 wire-covered runs were procured for the coops. Electric wiring was installed for the quail brooders and the electric incubator.

Forty portable pheasant breeding cages were constructed.

A hothouse 20 x 10 ft. was constructed to start green food.

Twelve large feed hoppers were constructed for use in the range pens, and 16 green food hoppers for use in the intermediate pheasant pens.

Ventilators were built and installed in the incubator cellar.

The tractor shed and all brooder houses were painted.

Repairs were made to the barn floor, a new door sill and some new planking put in, cement runways were built at both entrances, and lightning rods installed on the barn.

The old cottage which was used formerly to house adult pheasants during the winter, was remodelled to be used as a tractor and farm implement shed.

Forty-two acres of previously cultivated land were plowed and seeded to rye, oats, clover, and some vegetables planted. Twelve additional acres were cleared of brush and trees, and the land put under cultivation, making a total of about 75 acres of cleared land.

The large swamp and 34 acres of land on the westerly side of the farm were cleared of brush and trees, through an arrangement by which the lumber was taken in exchange for the clearing job.

Ten acres of brush land on the easterly side of the farm were enclosed with a 7-foot fence for the establishment of a rabbit colony.

No reforestation was done.

NEW EQUIPMENT. — There were added to the station equipment a Petersime No. 5 all-electric incubator; a one and one-half ton Chevrolet truck; 5 h. p. electric motor and saw table installed in the workshop; sawing outfit for the Fordson tractor; 15 additional Simplex oil-burning brooder stoves for the pheasant rearing units.

PHEASANT BREEDING. — The year opened with 367 adult hen pheasants on hand as brood stock, and 70 which had been carried over for distribution in December, or a total of 437 adults.

The 70 birds were distributed early in December to sportsmen's clubs to be carried through the winter of 1929-30.

To the 367 brood stock hens were added, on December 4, 65 cocks purchased



from a private dealer. The brood stock was carried through the winter, wing-clipped, in the large uncovered yard west of the farmhouse. Brush piles were scattered about the yard as a protection against winged vermin, and traps were set around the outside to protect against ground vermin. The birds were fed once each week Chapin Lay-All Kernels in hoppers, with fresh water, grit and charcoal.

Up to March 30, thirty had been lost or escaped, and 402 (64 cocks and 338 hens) remained on hand at the beginning of the laying season. During the second week in March the birds were caught up and placed, 6 hens to one cock, in individual portable cages. These cages were moved once each month during the breeding season, so as to keep the birds on fresh green sod. No change was made in the feeding of the birds during the breeding season, except that oyster shells were kept before them at all times. During very warm weather water was given twice daily, and the hoppers were filled with Lay-All Kernels every second day.

From this brood stock 20,313 eggs were collected, 303 of which were broken, 1,453 used for feeding young birds, 20 distributed for experimental purposes, and the remaining 18,537 set in incubators. Of those set, 9,537 proved to be infertile in incubators, contained dead germ, or were otherwise lost, and 9,000 hatched.

Hatching was done part in the Petersime electric incubator, and part in some of the oil-heated Buckeye machines. When eggs were first put in the Petersime the heat was adjusted to 100 degrees, and the eggs were turned once every six hours. This machine would work all right up to the time when the chicks should hatch out. At this time the heat should gradually be increased to 103 degrees, but this machine is planned so that the thermostats will not allow the heat to increase above the incubating temperature of 100 degrees to which the machine has been adjusted. Therefore the first hatch was very poor. Then transferring the eggs to the small Buckeye machines on the eighteenth day was tried, but as it was not known at what heat to set these machines to receive the eggs, the next hatches were not good, although they were better than the Petersime hatch. After trying different temperatures in both machines it was found that 99½ degrees in the Petersime and 101 degrees in the Buckeye machines gave the best results. When the eggs were transferred to the Buckeye machines on the eighteenth day they were sprayed with warm water once each day, and were turned twice each day up to the time the eggs pipped. Then the machines were kept closed until the hatch was completed.

Of the 9,000 chicks hatched 5,101 were reared. The plan for caring for the young birds was as follows. Three days before the chicks were ready to leave the incubators, the stoves were started so as to regulate the brooder heat to 90 degrees at 15 inches from the base of the brooder stove. A screen of cellar wire fifteen inches high was placed around the stove and about 36 inches from the stove. Inside this screen were placed two water fountains, and two baby chick hoppers filled with Purina Starting Mash, to which was added 20 per cent dried skim milk (this dry mash was kept before the chicks at all times). The chicks were then placed inside the screen and fed four times daily with Spratt's No. 12 Game Meal moistened with boiling water to make a crumbly mash, to which was added 25 per cent finely chopped hard-boiled egg. In feeding egg to the birds it was planned not to give more than one egg to each 100 birds, so by adding more of the game meal as the birds grew, and not increasing the egg, the egg could gradually be eliminated. At the age of three weeks the birds were transferred to the intermediate brooder houses, and the heat was lowered to 85 degrees. From the time the chicks were two days old to the age of six weeks, fresh green food was given twice daily. After the chicks were moved to the intermediate houses, the Purina Starting Mash was changed to Purina Growing Mash, but the 20 per cent dried milk was still added, and the birds were fed Spratt's Meal and egg three times each day. During the fifth week the heat was shut off, so that the birds had no brooder heat for at least one week. Between the sixth and seventh weeks the birds were moved to the open range pens. Then Chapin's Lay-All Kernels were gradually mixed with the dry mash, so that at the end of the eighth week they were being fed the straight Kernels. At this time the Spratt's Game Meal and egg were fed lightly morning and evening, and at the end of the eighth week



this was eliminated. From this time on the birds were fed only the Kernels and water.

No recognizable disease was found amongst the pheasants this season. There was considerable loss among the baby chicks from diarrhoea, and samples were sent to the Department of Veterinary Science, Massachusetts Agricultural College, at Amherst. These were examined by Dr. Glen L. Dunlap, who reported the finding of an unclassified organism. On July 6 there was a sudden very heavy rain-storm that flooded most of the brooder houses. In this storm 118 chicks were drowned, and many others contracted pneumonia and died later. On August 13 there was a light frost, and on the morning of the 14th, 119 of the youngest range birds were found dead. On August 17, a skunk got into one of the range pens and killed 78 birds. A few birds died from crowding during the cold snaps after the heat was shut off in the brooder houses.

Of the 5,101 young birds reared, 100 were distributed for liberation, 4,951 for wintering, and there remain on hand November 30, fifty of the 1930-hatched birds, reserved for brood stock.

Of the 402 (64 cocks and 338 hens) brood stock on hand at the beginning of the laying season, 13 were lost, 20 (10 cocks and 10 hens) were distributed for liberation, and 369 (54 cocks and 315 hens) remain on hand November 30.

There were destroyed at the farm by trapping during the year, 11 house cats, 34 skunks, 6 barred owls, 2 great horned owls, 5 screech owls and 13 hawks.

**QUAIL BREEDING.** — While a limited amount of quail propagation was carried on at this farm years ago, it was not until this year that steps were taken to start the breeding of these birds on a substantial scale.

The brood stock for the year's work consisted of 40 birds, ten pairs of which were received on March 26 from the Virginia State Game Farm, and ten pairs on April 1 from the White Oak Quail Farm, Richmond, Va., of which W. B. Coleman is the superintendent. The birds were held in two of the pheasant breeding cages while the quail breeding cages were being built. These were the type described in the report of the Marshfield Game Farm.

The quail were mated and put into the breeding cages during the first week in April. The pens were located on sod inside the brailing yard, and off to one side where the birds would be free from disturbance. From the time of their arrival, on through the balance of the year, the breeders were fed Spratt's Chicgrain, to which was added about twenty-five per cent wheat and buckwheat mixed in equal parts. They were also fed Wirthmore Laying Mash. These feeds were supplied in separate hoppers and kept before the birds at all times. Clabbered skim milk was likewise supplied the birds at all times. During the middle of May, many of the breeding cages were denuded. Then lettuce was bought and hung up in the cages, to supply the necessary green food, but the birds did not eat it. Then spinach was tried, a little of which was eaten, but not enough. Next canned tomatoes were tried, and this the birds ate readily. A majority of the pairs would eat one teacup full every two days. The tomatoes were fed from May 21 to the end of the laying season, or until the birds were transferred to the wintering pens. They were fed in small half-pint glass bowls, in which were placed inverted wine glasses. Then cabbage, mangle and apples were tried. Some of the quail ate a little of the cabbage, but all of them would eat apples, so the latter are now being fed.

The feed hoppers were cleaned once each week and grain and mash were fed once each day. The milk and tomato dishes were cleaned every day, and fresh clabber and tomatoes put in.

On April 9 the first egg was seen. At this time the weather was very mild, and all of the pairs were making nests, which seemed to indicate that the hens were ready to start laying. Then the weather changed. It became cold, wet and windy, with several frosts, that seemed to stop their preparations to lay. This weather held until the end of the month, when it gradually became mild. The birds again started to make nests, and at this time a few started laying. On the tenth of May, 11 eggs were collected. At this time the weather again turned cold, with high winds, which checked the laying, and it was the last day of the month before the next eggs were collected. From that time on the eggs were

collected on Saturday of each week. The largest number of eggs laid by any one hen was 89, and the smallest, 28. The total number taken during the season was 1,151, of which 6 were broken and 1,145 set.

The first twenty eggs were placed in the Petersime incubator on May 29, starting at a temperature of 100 degrees with the wet bulb thermometer registering 60 degrees moisture, the highest moisture content we could get in this machine. During the hatching period the eggs were turned once every six hours, or four times per day. The foregoing temperature and moisture were maintained until about June 15, when the heat was increased to 102 degrees. On June 18 the eggs were tested and five were found to be infertile. The remaining 15 fertile eggs were removed from the Petersime and placed in one of the oil-heated Buckeye incubators to complete the hatch. This for the reason that we found, through experimenting with pheasant eggs, that the Petersime would not hatch well. From the 15 fertile eggs 12 good chicks and one cripple hatched. From May 31 to the end of the hatching season, eggs were put into the Petersime every Saturday evening, and every Thursday the next lot to hatch were tested and transferred to a Buckeye machine. By these arrangements the eggs were in the Petersime for 18 days and in the Buckeye incubators for 4 to 5 days. The Buckeye incubators are kerosene burners No. 4, which have been at the farm for some years. The temperature of the Buckeye, when the eggs were transferred to it from the Petersime, was 101, and at the time of hatching was 105. Before the eggs were transferred to the Buckeye, two pads were made, as follows. One piece of board 18 inches long and 3 inches wide was wrapped with absorbent cotton and then covered with burlap sacking, which was stitched tightly. This made a flat pad 20 inches long and 5 inches in width by 2 inches in thickness. Two of these pads were soaked in warm water and were placed one on each side of the egg tray. Then, with the ventilators closed and the temperature registering 101 degrees, the machine was ready to receive the eggs. The ventilators were not opened again until the hatch was completed. The moisture content of these machines could not be definitely ascertained, as the eggs were sprayed with water daily, and the pads were soaked on the eighteenth day and again on the twenty-first day. The wet bulb thermometer showed a variation of from 50 to 65 degrees moisture.

On June 26 the second lot of eggs started to hatch, but the hatch was not complete until the 28th. Thirty-three chicks hatched from 49 fertile eggs. This showed that the machine was being run too hot. The temperature was now dropped to  $99\frac{1}{2}$  degrees, as recommended by the manufacturers. Some time between 6 P.M. and 11 P.M. on July 1 the breaker points in the Petersime fused. When this was noticed at 11 P.M., the heat had increased to 106 degrees. The power was immediately shut off, the points cleaned, and it was necessary to stay with the machine for the next six hours to get it back to the proper temperature. All the eggs in the machine were affected by this increase in the temperature, as shown by the next hatches: July 8, — 12 chicks out of 93 eggs, and July 15, — 51 chicks out of 96 eggs. From then on we had no fault to find with the hatches, as on three occasions one hundred per cent hatches from fertile eggs were obtained. The laying season continued up to September 13, when the last eggs were taken. Fertility from June 15 to August 12 averaged 85 per cent. All the eggs set were started in the Petersime incubator and carried therein until the eighteenth day, and then transferred to a Buckeye, as previously stated. Of the 1,145 eggs set, 407 were infertile, contained dead germs, or were otherwise lost, and 738 hatched.

The farm was equipped with 26 of the Coleman type of brooder boxes with electric heaters, described elsewhere in this report. They were located on frames above ground, with six-foot wire bottomed runs. The general construction and arrangement of the runs was similar to that at the other farms, although each superintendent, in constructing his runs, made some small changes. The runs at this farm had floorings under the wire, with arrangement for cleaning out the droppings, which were collected and destroyed. This plan was followed at the Ayer and the Marshfield Game Farms, but there was no flooring underneath the runs at Sandwich. In common with the other farms, the electric heaters were equipped with 25-watt bulbs. Preliminary tests before the birds were put in the brooder boxes showed that at noon the temperature at the edge of the brooder



hover was 110 degrees; at 6 P.M., 95 degrees; at 9 P.M., 80 degrees; and at midnight, 55 degrees. To offset this variation in temperature (which occurred throughout the entire rearing period), disks of newspaper were placed on the wire floor of the brooder compartment, directly under the hover. At the beginning the brooder boxes were covered at night with a heavy blanket. This was the condition when, on June 22, the first lot of 13 chicks was put in a brooder unit. On the third day a crippled bird died, but the other 12 were all reared. With the subsequent lots of birds, 6 disks of paper were placed under each brooder hover, one being removed each day for sanitary reasons. After the first week with the first lot of birds the use of the blanket at night was discontinued. During the first week in August the use of the paper disks was discontinued on account of the warm weather. On August 12, 72 chicks were placed in the brooders, and on the morning of the 13th there was a light frost. During that week, 30 of these 72 chicks died through being chilled on that morning. Paper disks were restored to the boxes. For the first two weeks following, the weather continued cool, with several rainstorms. During this time cannibalism developed. While previous to this period several individual cases of toe and bill picking had appeared, it was not until this dull, wet season set in, that several broods started picking. In one instance at 2 P.M. the birds were all right, and about 5 o'clock the superintendent noticed the birds were jumping about in the run. Investigation showed that every bird in the brooder was picked, and out of the 15 birds in this brooder, 12 died. From then on the birds were watched closely, and other sudden outbreaks were checked. The majority of losses throughout the season were from this cause. As a preventive the commercial toe-picking pastes were tried, but these rubbed off too quickly to be effective. It was found that clipping the upper bill would check the habit until the bill had hardened. Then they would start all over again. The best method of controlling this habit was by the use of a roofing cement called Plastic Elastigum, which does not harden. When this was applied and road dust sprinkled over it (to keep the smear from adhering to the feathers), the cement would stay on until the picked birds healed over. Aside from this, the losses of young birds were due to weaknesses resulting through the lack of equipment to maintain the proper heat in the brooder boxes. There was no evidence of disease, and no lots of birds were treated for any disease symptoms.

The young quail were fed as follows. During the first week a tray of Larro Starting Mash, a separate tray of fine grit, and a dish of clabbered milk, were kept before them at all times. Twice each day finely chopped lettuce was sprinkled over the tray of grit. After the third day a small tray of Tennessee-grown German millet was added. During this first week all feeds were given to the birds in small glass ash trays. In the milk dish an inverted whiskey glass was placed, to keep the birds from walking through the clabber. At the end of the first week, Spratt's Chicgrain was mixed in equal parts with millet and placed in a hopper. Larro Starting Mash was placed in a separate, specially made galvanized hopper. Chopped lettuce was continued at all times, and in addition, in order to keep the quail occupied, lettuce in net bags was hung against the sides of the runs where they could work on it. These feeds were given to the birds in these proportions and in separate hoppers, throughout the remainder of the growing period up to the close of the year. The green food only was changed. About the first of August, cucumbers were split lengthwise and one-half stuck on two nails on one side of the run, about one inch above the wire floor. The chicks immediately started eating the seeds and the juicy pulp, but they did not care much for the solid part until they had reached the age of five weeks, when they would eat all the cucumber, rind included. During August the lettuce became very tough, and the young poultry cabbage was chopped and fed to the baby chicks. As this was relished by them, we continued to feed it during August, to the baby chicks only, as cucumbers were being fed to the older birds. Then fresh green cucumbers were tried, and as the chicks took to them at once, cucumbers only were fed to all of the young birds up to the middle of October, when the cucumber crop failed. Since then, apples have been fed, and although not a good substitute for the cucumbers, the birds eat some of them.

Between the age of 6 and 7 weeks, the birds were removed from the heated



brooders and placed on the ground in the type of pen described as the breeding pen at the East Sandwich Game Farm, together with one of the shelter boxes. All feeding of the young birds was done in the shelter boxes, with the exception of green food. The cucumbers were stuck on nails on the sides of the cages. One cucumber split in two was given twice each day. These cages were moved to fresh ground once every two weeks. In this connection the shelter boxes were found to be of great assistance in moving the birds by the method described elsewhere. The young quail have been carried in these breeding cages in lots of from 9 to 17 up to the present time, and will be so wintered.

Of the 738 chicks hatched, 315 were lost and 423 reared.

Of the 20 hens and 20 cocks used as breeders, 7 hens died and one cock escaped. The first dead hen was found on July 5. This bird was sent to the Massachusetts Agricultural College, Department of Veterinary Science, and was examined by Dr. Glen L. Dunlap, who reported death from blackhead. The other 6 were not examined. Dr. Dunlap could only recommend sanitation as a means of controlling blackhead. All of the birds that died showed the same symptoms before death, that is, they would lay eggs up to two days before death, then fluff out the feathers and become very weak, usually standing on the nest or in a corner until death, which occurred always within two days. No other symptoms of disease have been noted.

At the close of the year, November 30, there remain on hand 32 (19 cocks and 13 hens) of the brood stock, and 423 practically full-grown quail.

**COTTONTAIL RABBITS.** — In line with our plans to establish several colonies of cottontails throughout the State, ten acres were enclosed at this farm for a start on such a colony. Sixty-seven native cottontails were trapped and placed within the enclosure between February 1 and April 2. Despite the precautions taken to make the fence tight, by the close of the year most of the colony had escaped. There is a great deal of favorable cover for cottontails on the game farm, and there was every indication that a number of them bred locally. Toward the close of the year the fence was further reinforced, to be placed in proper condition for a new stocking during the coming winter.

## FISH AND GAME DISTRIBUTION

### FISH DISTRIBUTION

There has been little change in the methods of fish distribution of recent years. The two fish culturists in charge of our salvage units have continued to act as fish messengers as far as the salvage operations will permit. The accomplishments of these two messengers have served to demonstrate the value of using our own messengers, not only to transport the fish from the hatcheries and pond units, but to make the plantings as well. Our conclusion should not be considered as casting any reflection on the activities of the fish distribution committees of the local clubs, for they have, in the main, rendered a highly intelligent and faithful service. But there are many objections to the present plan which can be largely overcome by a closer tie-in between the local fish distributing committees and fish messengers of the Division.

Again we take the opportunity to congratulate the 30 local clubs and chapters of the Izaak Walton League, and individuals, for their splendid efforts to supplement the work of the Division by constructing pools at their own expense, and supplying care and food to rear allotments of trout to a larger size. While the drought conditions revealed certain weaknesses in some of the small pond rearing units built up by the local organizations, it had a great educational value in demonstrating to all and sundry, the difficulties of fish production, and went further to enlarge the sum total of the experience of those handling these local enterprises.

**BROOK TROUT.** — By the fall of 1929 each station had selected sufficient of its choicest 1929-hatched fingerlings to carry through the winter for liberation in the spring of 1930 as yearlings.

There were distributed (as by-products and for rearing) 88,385 fingerlings. It is now part of our plan of fish distribution to plant fingerling fish; but in concen-

trating on the production and distribution of legal-sized yearling fish only, enough fingerling fish must be carried through at the hatcheries from which to select a uniform stock for this annual yearling distribution, which necessitates culling out and discarding, during the process, a considerable number of fingerlings. This thinning out also makes for a better growth in the yearling fish.

There were distributed from all sources, to public waters, to clubs for further rearing and later distribution, and for exhibit, study, etc., 366,789 yearling brook trout. (See table of distribution at the end of this section.)

There were 722 adult trout distributed, 710 of which went to open waters and 12 used for display purposes. Stocking of ponds with adult stripped trout was continued in the following waters: Peters Pond, Sandwich; Jobs Neck Pond, Edgartown; Upper Chilmark Pond, Chilmark; Congamond Lakes, Southwick.

At the close of the year, there are on hand at all the stations 372,700 (1930-hatched) fingerlings, 4,212 yearlings, and 5,734 adults.

**BROWN TROUT.** — During the year 500 fry, 20,125 fingerlings, 350 yearlings, and 10,222 adults were distributed to public waters, to a club for further rearing, and later distribution, and for exhibit, study, etc. At the close of the year, there are on hand 40,000 fingerlings, 7,800 yearlings, and 900 adults.

**RAINBOW TROUT.** — No rainbow trout were distributed during the year. There are on hand at the close of the year 8,500 fingerlings, 3,200 yearlings, and 1,709 adults.

**CHINOOK SALMON.** — No Chinook Salmon were handled at our stations this year.

**SMALL-MOUTH BLACK BASS.** — The entire production of small-mouth black bass at the Palmer Hatchery (with the exception of a small number distributed for display purposes), 196,000 fry, 52,650 fingerlings, and 7 adults, was planted in the following specially selected waters: Black Pond, Chatham; Scargo Lake, Dennis; Spectacle Pond, Sandwich; Long Pond, Yarmouth; Dennis Pond, Yarmouth; Gull Pond, Wellfleet; Great Pond, Wellfleet; Onota Lake, Pittsfield; Richmond Pond, Richmond and Pittsfield; Laurel Lake, Lee and Lenox; Greenwater Pond, Becket; Lower Goose Pond, Tyrringham and Lee; Lake Buel, Monterey and New Marlboro; Ashmere Lake, Hinsdale; Plunkett's Reservoir, Hinsdale; Center Lake, Becket; Sabbatia Lake, Taunton; Devol Pond, Westport; Sassaquin Pond, New Bedford; Fosters Pond, Andover; Hoods Pond, Ipswich and Topsfield; Ashfield Pond, Ashfield; Forest Lake, Palmer; Lake George, Wales; Goshen Reservoir, Goshen; Hampton Ponds, Westfield and Southampton; Waushakum Pond, Ashland and Framingham; Fort Meadow Pond, Marlboro; Duck Pond, Groton; Morses Pond, Wellesley; Massapoag Pond, Sharon; Cranberry Pond, Bellingham and Blackstone; Nippenicket Pond, Bridgewater; Maquan Pond, Hanson; Snows Pond, Rochester; College Pond, Plymouth; Sampson's Pond, Carver; Stetson's Pond, Pembroke; Jamaica Pond, Boston; Lake Monomona, Winchendon; Asneconick Lake, Hubbardston; Coes Pond, Worcester; Lead Mine Pond, Sturbridge.

The bass collected in miscellaneous salvage jobs (with the exception of those turned over to the U. S. Bureau for breeders and those used for display purposes) were planted in suitable ponds near the locations from which the fish were taken.

**BLUE GILLS, CRAPPIE, HORNED POUT, PICKEREL, YELLOW PERCH, WHITE PERCH, LARGE-MOUTH BLACK BASS.** — An unusually large stock of native pond fish was distributed from the Merrill Pond System, in addition to horned pout from the Palmer Fish Hatchery, pickerel purchased from a private pond, and the fish collected in the various salvage operations. (For details, see Field Propagation and Salvage Work.)

**MUSKALLONGE.** — The New York Conservation Commission furnished 25,000 muskallonge fry which were planted in the Connecticut River at Gill.

**ALEWIFE.** — No distribution of alewives was made during the year.

**WORK OF THE SALVAGE UNITS.** — The detailed report of this work, usually made at this point in the report, has been transferred to the section on Field Propagation and Salvage Work.

In the following table, in estimating the sizes of the fish, we have graded them on even inches. For example, all fish 2 inches in length and less than 3 inches in length are classified as 2-inch fish.

FISH DISTRIBUTION, DECEMBER 1, 1929, TO NOVEMBER 30, 1930

[This table does not show transfers from one station to another or brood stock added to station stock from salvage work]

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCT (SEINED, PURCHASED, GIFT, ETC.)			Grand Total
	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exchange, or to United States Bureau	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exchange, or to United States Bureau	
Brook Trout:							
Eggs . . . . .	-	-	100,000	-	-	-	100,000
Food-sac fry . . . . .	-	-	1,000	-	-	-	1,000
1 in. . . . .	-	39,200	-	-	-	-	39,200
2 in. . . . .	16,000	11,500	-	-	-	-	27,500
3 in. . . . .	26,125	3,000	85	-	-	-	29,210
4 in. . . . .	5,080	6,590	12	-	-	-	11,682
5 in. . . . .	3,355	40,580	-	-	-	-	43,935
6 in. . . . .	138,083	1,200	1,012	-	-	-	140,295
7 in. . . . .	119,509	1,050	1,002	-	-	-	121,561
8 in. . . . .	41,456	300	35	-	-	-	41,791
10 in. . . . .	150	-	-	-	-	-	150
11 in. . . . .	185	-	-	-	-	-	185
12 in. . . . .	225	-	4	-	-	-	229
13 in. . . . .	150	-	-	-	-	-	150
14 in. . . . .	-	-	4	-	-	-	4
16 in. . . . .	-	-	4	-	-	-	4
Total Brook Trout:							
Eggs and Food-sac fry . . . . .	-	-	101,000	-	-	-	101,000
Fish 1"-16" . . . . .	350,318	103,420	2,158	-	-	-	455,896
Brown Trout:							
Food-sac fry . . . . .	-	-	500	-	-	-	500
2 in. . . . .	10,000	-	-	-	-	-	10,000
3 in. . . . .	10,000	-	40	-	-	-	10,040
4 in. . . . .	-	100	85	-	-	-	185
5 in. . . . .	-	200	-	-	-	-	200
6 in. . . . .	1,400	-	-	-	-	-	1,400
7 in. . . . .	2,700	-	22	-	-	-	2,722
8 in. . . . .	2,350	-	30	-	-	-	2,380
9 in. . . . .	1,650	-	7	-	-	-	1,657
10 in. . . . .	1,350	-	-	-	-	-	1,350
11 in. . . . .	550	-	-	-	-	-	550
15 in. . . . .	-	-	12	-	-	-	12
18 in. . . . .	50	-	1	-	-	-	51
20 in. . . . .	75	-	-	-	-	-	75
22 in. . . . .	75	-	-	-	-	-	75
Total Brown Trout:							
Food-sac fry . . . . .	-	-	500	-	-	-	500
Fish 2"-22" . . . . .	30,200	300	197	-	-	-	30,697
Blue Gills:							
1 to 2 in. . . . .	292,500	2,000	-	-	-	-	294,500
2 to 3 in. . . . .	-	-	-	60	-	-	60
4 in. . . . .	5,311	-	6	-	-	-	5,317
5 in. . . . .	4,533	75	51	-	-	-	4,659
6 in. . . . .	2,223	50	60	-	-	-	2,333
7 in. . . . .	1,278	225	43	-	-	-	1,546
8 in. . . . .	925	-	-	-	-	-	925
9 in. . . . .	10	-	-	-	-	-	10
10 in. . . . .	10	-	-	-	-	-	10
Total Blue Gills . . . . .	306,790	2,350	160	60	-	-	309,360
Crappie:							
1 to 3 in. . . . .	159,100	3,300	-	-	-	-	162,400
5 to 6 in. . . . .	14,995	-	-	-	-	-	14,995
7 to 8 in. . . . .	1,124	325	82	-	-	-	1,531
8 to 10 in. . . . .	64	45	180	-	-	-	289
10 to 12 in. . . . .	72	-	36	-	-	-	108
Total Crappie . . . . .	175,355	3,670	298	-	-	-	179,323



	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCT (SEINED, PURCHASED, GIFTS, ETC.)			Grand Total
	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exchange, or to United States Bureau	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exchange, or to United States Bureau	
<b>Horned Pout:</b>							
1 to 2 in. . . . .	-	-	-	1,250	-	-	1,250
2 to 3 in. . . . .	183,942	14,500	-	52,084	-	-	250,526
3 to 4 in. . . . .	9,000	2,000	-	8,168	-	8	19,176
5 to 6 in. . . . .	39,340	-	-	1,970	-	-	41,310
6 in. . . . .	9,612	1,050	56	2,625	-	-	13,343
7 in. . . . .	5,259	275	14	450	-	-	5,998
8 in. . . . .	5,797	80	37	2,176	-	-	8,090
9 in. . . . .	797	75	37	754	225	-	1,888
10 to 12 in. . . . .	54	50	167	5,441	-	22	5,734
12 to 15 in. . . . .	-	-	-	2,846	-	12	2,858
Total Horned Pout . . . . .	253,801	18,030	311	77,764	225	42	350,173
<b>Pickereel:</b>							
2 to 3 in. . . . .	-	-	-	50	-	-	50
3 to 5 in. . . . .	1,050	-	-	1,465	-	-	2,515
5 to 7 in. . . . .	-	-	-	7,563	-	5	7,568
8 to 10 in. . . . .	557	-	12	4,865	-	-	5,434
10 to 12 in. . . . .	437	70	29	1,325	-	-	1,861
12 to 15 in. . . . .	6	125	94	1,526	-	-	1,751
15 to 20 in. . . . .	-	-	-	973	-	5	978
20 to 25 in. . . . .	-	-	-	413	-	20	433
Total Pickereel . . . . .	2,050	195	135	18,180	-	30	20,590
<b>Yellow Perch:</b>							
1 to 3 in. . . . .	8,850	300	-	200	-	-	9,350
3 to 5 in. . . . .	56,900	4,300	-	2,000	-	-	63,200
6 to 8 in. . . . .	4,970	200	4	2,925	-	4	8,103
8 to 10 in. . . . .	230	650	133	3,445	-	100	4,558
10 to 12 in. . . . .	30	-	30	3,092	-	-	3,152
12 to 15 in. . . . .	-	-	-	1,500	-	15	1,515
Total Yellow Perch . . . . .	70,980	5,450	167	13,162	-	119	89,878
<b>White Perch:</b>							
3 to 5 in. . . . .	-	-	-	145,600	-	-	145,600
5 to 6 in. . . . .	-	-	-	10,400	-	-	10,400
6 to 8 in. . . . .	-	-	-	2,000	-	3	2,003
8 to 10 in. . . . .	-	-	-	3,452	-	3	3,455
10 to 12 in. . . . .	-	-	-	24,980	-	20	25,000
Total White Perch . . . . .	-	-	-	186,432	-	26	186,458
<b>Small-mouth Black Bass:</b>							
0 to 1 in. . . . .	196,000	-	-	-	-	-	196,000
1 to 2 in. . . . .	40,500	-	-	-	-	-	40,500
2 to 3 in. . . . .	6,900	-	-	-	-	-	6,900
3 to 4 in. . . . .	4,700	-	30	-	-	-	4,730
4 to 5 in. . . . .	300	-	20	-	-	-	320
5 to 7 in. . . . .	200	-	-	-	-	-	200
7 to 9 in. . . . .	-	-	-	-	-	12	12
9 to 10 in. . . . .	-	-	-	130	-	10	140
10 to 12 in. . . . .	-	-	-	3,620	-	-	3,620
12 to 14 in. . . . .	-	-	5	2,666	-	140	2,811
14 to 18 in. . . . .	-	-	2	1,669	-	20	1,691
18 to 22 in. . . . .	-	-	-	80	-	-	80
Total, Small-mouth Black Bass . . . . .	248,600	-	57	8,165	-	182	257,004
<b>Large-mouth Black Bass:</b>							
10 to 12 in. . . . .	-	-	32	47	-	-	79
Total Large-mouth Black Bass . . . . .	-	-	32	47	-	-	79
<b>Muskallonge:</b>							
Food-sac fry . . . . .	-	-	-	25,000	-	-	25,000
Total Muskallonge . . . . .	-	-	-	25,000	-	-	25,000
<b>Pike Perch:</b>							
20 to 25 in. . . . .	-	-	-	12	-	-	12
Total Pike Perch . . . . .	-	-	-	12	-	-	12
<b>Total — Trout and Pond Fish Distributed (not including eggs and food-sac fry), 1,879,470</b>							

(See continuation of table on page following.)

In addition, the following forms were distributed during the period December 1, 1929, to November 30, 1930.

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCT (SEINED, PURCHASED, GIFT, ETC.)			Grand Total
	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exchange, or to United States Bureau	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exchange, or to United States Bureau	
Sunfish:							
4 in. . . . .	600	-	-	223	-	-	823
5 in. . . . .	1,200	-	-	105	-	-	1,305
6 in. . . . .	-	-	105	260	-	-	365
7 in. . . . .	-	-	-	125	-	-	125
8 in. . . . .	-	-	-	20	-	-	20
Total Sunfish . . .	1,800	-	105	733	-	-	2,638
Miscellaneous:							
Carp, 22 in. . . . .	-	-	-	-	-	4	4
Eels, 20 in. . . . .	-	-	-	-	-	10	10
Crawfish . . . . .	13,300	500	-	-	-	-	13,800
Tadpoles and shiners . .	275,900	-	116	-	-	-	276,016
Total — Miscellaneous	289,200	500	116	-	-	14	289,830
<b>Total — Sunfish and Miscellaneous, 292,468</b>							

#### GAME DISTRIBUTION

**PHEASANTS.** — The output of the game farms was handled along the lines of previous years, with one exception. It has been our policy to distribute the annual output of pheasants to individuals and local clubs which would carry the same through the winter at their own expense for pens, labor, and feed, in order that the birds may be liberated in the spring as adults. Again the number of young pheasants exceeded our expectations, with a result that sufficient accommodations could not be found for all of the birds. Again we followed the plan of last year, in arranging with certain clubs that took the first birds sent out to liberate these birds after the shooting season and take on a new lot of the latest birds to be sent out. The departure from the previous plan was that 2,330 of the early hatched birds, which were raised under conditions that kept them full-winged, were liberated direct from the game farms to the covers at the age of three months or older. Some of these birds were at least fifteen weeks of age. This was due to the fact that some of the clubs which agreed to provide facilities early were not ready according to schedule, and after the birds allotted to them were held awhile at our game farms they were released.

Of the 13,968 young pheasants distributed for wintering, 1,813 were sent to the clubs as replacements after the shooting season.

Of the 2,330 young pheasants liberated, 645 were released in open covers in Barnstable County, for the reason that there is only one club covering the entire county, and its wintering facilities are limited. The other birds were scattered throughout the State on reservations where no shooting is permitted.

Further progress was made in encouraging those who took birds for wintering, to adopt a hopper method of feeding with a single food ration. Eighty-three hoppers four feet in length were loaned to those who would use them, and it was recommended that in these hoppers only Lay-All grade of Chapin's Kernels, be fed. Along with this it was recommended that as much green food as possible be given the birds, and that fresh water and plenty of charcoal and ground oyster

shells be kept before them at all times. Emphasis was placed on the necessity of keeping the pens thoroughly clean. In the early spring, instructions were sent to all parties wintering birds, relative to the cleaning of the pens and renewing the surface of the ground.

There was a slight increase in the number of eggs shipped to individuals and clubs for incubation, and the rearing of the young. It is not our intention to go into the shipping of eggs on a large scale, but rather to have on hand enough to take care of the gradually increasing demand. This practice has several advantages that more than offset the limited results obtained by those who take the eggs. It stimulates interest and is part of our educational program to encourage the sportsmen to help themselves and thereby supplement the efforts of the Division. It brings home to hundreds of people each year, some of the practical difficulties of rearing game birds on a large scale, which is resulting in greater appreciation of the stock which the Division ships out. This can also be said of the fish which are annually shipped to local rearing pools. Moreover, it is educating a group of our sportsmen in the business of game bird breeding and may encourage some of the younger generation to go into this field commercially.

We continue to stress the need of one or more qualified bird culturists who can spend a substantial portion of each year travelling from unit to unit where the birds are wintered to advise on their care and to assist in dealing with any diseases or such troubles as cannibalism, that may appear. A similar service should be rendered to those rearing fish. Such travelling inspector, or advisor, would save many birds and materially advance the education of those handling the stock.

There were 14,892 eggs distributed (100 for experimental purposes and 14,792 for hatching). Of the eggs distributed to the clubs and individuals, 4,803 hatched. Of these 957 were reared to the age of at least three months, and liberated, 577 are being carried through the winter for spring liberation, and 27 were added to the brood stock at one of our game farms, — making a total of 1,561 birds produced in this branch of the work.

There were 754 adult pheasants liberated in the covers. These were discards from the brood stocks and the Ayer egg-stock and 150 purchased birds. In addition 70 adults were distributed in December, 1929, for carrying through the winter of 1929-1930.

At the close of the year there are on hand at the four game farms for brood stock 819 (1930-hatched) and 1,276 adult pheasants.

**WHITE HARES.** — There were 1,916 white hares imported, of which 1,911 were liberated and 5 used for the study of disease. Each year more and more effort is made to put them only in covers which are suitable. There are large stretches of low growth scrub oak in some sections of the State and other sections along the coast practically free from snow throughout the year, that are entirely unsuitable for these animals.

**COTTONTAIL RABBITS.** — Penikese Island supplied 387 cottontails for restocking on the mainland. (For details see Penikese Island Sanctuary.) In addition 2 cottontail rabbits were trapped and used in the study of disease. Seventy additional cottontail rabbits trapped where they are plentiful were released in other covers.

**JACK RABBITS.** — Eight were purchased and used for experimental work in connection with the study of disease. (See the section on Hares and Rabbits under Wild Birds and Animals.)

**QUAIL.** — An experimental planting of 15 pairs of quail was made on Nantucket Island in an effort to reestablish the quail on this island. (For details see Wild Birds and Animals — Quail.) In addition one pair was distributed for experimental work.

**RUFFED GROUSE.** — An experimental planting of 39 ruffed grouse was made on Marthas Vineyard in an effort to reestablish the ruffed grouse. (For details see Wild Birds and Animals — Ruffed Grouse.)



## GAME DISTRIBUTION — DECEMBER 1, 1929, TO NOVEMBER 30, 1930

[This table does not show stock transferred from one game farm to another, nor additions to brood stocks.]

	PRODUCT OF STATE GAME FARMS				NOT PRODUCT OF STATE GAME FARMS (PURCHASED, GIFT, TRAPPED, ETC.)		Total
	Dis- tributed for Hatching	Liberated direct to Covers	Wintered by Clubs and Others for Liberation in Spring	Dis- tributed for Study, Exhibit, etc.	Liberated direct to Covers	Dis- tributed for Study, Exhibit, etc.	
Pheasants:							
Eggs	14,792	—	—	100	—	—	14,892
Young (reared by clubs and others from the 14,792 eggs reported above as distributed for hatching)	—	957	577 <sup>2</sup>	—	—	—	1,534
Young	—	2,330	13,968 <sup>2</sup>	3	—	—	16,301
Adult	—	604	70 <sup>1</sup>	3	150	—	827
Quail:							
Eggs	—	—	—	28	—	—	28
Adult	—	—	—	2	30	—	32
Ruffed Grouse:							
Adult	—	—	—	—	39	—	39
Cottontail Rabbits:							
Adult	—	387	—	2	70	—	459
Jack Rabbits:							
Adult	—	—	—	—	—	8	8
White Hares:							
Adult	—	—	—	—	1,911	5	1,916

<sup>1</sup> Carried through the winter of 1929-30.<sup>2</sup> Carried through the winter of 1930-31.

Last year we claimed, relative to the output of pheasants of the year, that "considering the number of birds and the age, this is the largest distribution ever made by the State, and we believe it constitutes a record in the production of pheasants in this country." In reference to this year's output of young pheasants, we would go further and say, — considering the artificial methods employed without a brood hen on the game farms (except for a part of the quail work at the East Sandwich Game Farm) the number of birds, the age at which they were liberated, and the total expenditure to produce them, nothing equal to this record can be found in the history of the world.

## MARINE FISHERIES

## GENERAL

In common with all other industries the marine fisheries of our Commonwealth have suffered very noticeably from the period of depression. In general two distinct effects may be noted.

The first response, which may be observed, was in the intensiveness with which the fisheries have been conducted, both as concerns increased equipment and the number of men engaged. Better equipment made it possible for the fishermen whenever one branch of the fisheries showed a decline in financial returns to respond either by fishing over a wider area or changing to another and more remunerative kind. Furthermore, whenever a branch of fishery seemed to be profitable, an increased number of persons entered it, which served to still further cut down the average return to the fishermen although the amount of fish caught increased.

Another effect of depression, and perhaps the most noticeable one, was in the very much lower prices which prevailed on all kinds of fish. In spite of the increased catch of some kinds of fish the low prices made it very difficult for the fishermen to secure adequate returns and thus the financial condition of the fisheries was brought to a very low ebb.

Nevertheless, the industry with splendid courage and with its usual confidence in the resources of the sea has responded to these adverse conditions by building still larger boats and adding the most modern machinery to their equipment.

Particularly evident in the records of this past year have been the unusual catches of haddock, mackerel, pollock, bluefish, striped bass, and whiting as detailed on the following pages. But caution should be observed in placing too much significance to the amount of these catches. The return of bluefish, striped bass, and whiting to abundance may be considered as real increases, but in the catch of all ground fish the records were made at the expense of more hours of dragging and the necessity of going farther and farther off shore. All of these factors must be borne in mind in any consideration of the actual conditions of our marine fisheries. Nevertheless, the department, in common with fishermen generally, has the utmost confidence in the fertility of our fishing banks and believes that with proper conservative practices the industry will continue to occupy the important place among the industries of the Commonwealth which it has enjoyed in the past.

The growing interest in planting shellfish seed in depleted areas which is evident in our coastal towns, especially in the Cape Cod section, demands special consideration and assistance. We are doing our utmost to foster and encourage such a plan in all our coastal towns.

The year was marked by an unusual event, namely, the First International Fisheries Convention, between organizations of this country and Canada, namely, the Canadian Fisheries Association and the United States Fisheries Association, which convened at Montreal on September 11. The convention continued through Friday and Saturday, during which time the several hundred members of both organizations who attended had the privilege of listening to timely talks on fishery subjects by members of both organizations. This exchange of views tended not only to increase the knowledge of present conditions but to auger well for the future. The Division of Fisheries and Game of the Department of Conservation was represented by its Director, William C. Adams and the State Inspector of Fish, Arthur L. Millett. The session was opened with a banquet at which the welcoming address was made by the Mayor of Montreal, and to your Director was given the honor of making the reply for the United States.

In September the Supervisor attended a meeting of the North American Oyster Growers' Association at Sayville, Long Island, and participated in the discussion of the problems connected with oyster culture.

#### INSPECTION OF FISH

The Inspector of Fish and his three deputies have completed a busy year. The extraordinary increase in the landings of fresh fish by Massachusetts vessels at Massachusetts ports since the fish inspection act, so-called, came into effect in 1919 (the catch in some lines having almost doubled) has enlarged the work out of all proportion to the size of the inspecting force. It should be recalled that a recent decision of the Attorney General that the word "fish" is all-embracing, places on this force the inspection, seizure and condemnation of shellfish and crustacea found unfit for food.

It is very unusual that any industry seeks supervision or increased supervision, but such is the fact with the fisheries industry. The leading men in the business and their representative organizations have gone emphatically on record with the Division that the one thing the Division of Fisheries and Game can do to assist the fishing industry of the Commonwealth is to have more deputy inspectors of fish. The wholesale fish producers who have their fingers on the public pulse and are responsive to the sentiment of the buyer for the home table, realize that the consumers want and must have confidence in the quality of the goods purchased.

Along this line and with reference to the desire of the fish producers to keep quality at a high point, it might be noted that apparently the old Roman injunction "*caveat emptor*" (let the buyer beware), is apparently ceasing to be part of the policy of the members of the fishing industry in dealing with the consumer. Time was, and not too many years ago, when this old Roman warning was possibly in strong effect. But thanks to changes for the better in business methods and



the steady, effectual work of fish inspection, it is now safe to say that the old order has changed and that the new slogan, "you know what you are getting" is in effect and becoming more and more operative day by day.

Certain it is the work of fish inspection is daily receiving more co-operation from the fishermen, the fishing captains, the fish buyers and commission men, and to quite an extent the great chain stores and the everyday retail dealer, than ever before. All this is very heartening and is encouraging all those connected with the industry and the inspection service to extend their efforts to have the fish-eating public of the Commonwealth served with only good fish. One hundred per cent teamwork cannot be expected, but it can be consistently said that all hands connected with the fisheries from the catching of fish to the retail seller thereof, are, with few exceptions, showing evidence of interested cooperation with this Division.

It has been the policy of this service since its establishment to go into print as little as possible as to its activities, particularly those pertaining to the correction of firms or individuals transgressing the fish inspection laws. It has been felt that unnecessary publicity as to the selling of fish unfit for food would serve no good purpose and might affect the demand for what is really a most economic and nutritional food. Particularly is this true when it is understood that the illegal practices are very limited compared to the annual volume of business transacted.

A few high points stand out in the routine of the service for the year, and it seems fitting here to refer briefly to them. The first, and one which in our opinion is of wide-reaching effect for good, has been the taking around of managers and superintendents of several of the great "chain" stores (which during the past few years have given considerable attention to the sale in their many stores of fish) on inspection trips. The heads of these stores have felt from time to time the odium of being brought into court by reason of displaying fish which in the opinion of this office has been unfit for food. However, they have been quick to sense the situation and just as quick to request the assistance of the office in taking their managers and superintendents about on inspection trips in order that they might see for themselves conditions that possibly they could not believe existed when cases were brought to court.

In all, seven such trips were made, each one under the direct charge of a deputy inspector of fish and aggregating the inspection of some thirty stores a day owned and operated by the particular chain whose manager happened on that day to be with the deputy. The effect was twofold; first, it showed to the superintending head that some of his stores were not living up to the fish inspection laws, and, second, it warned these large concerns to take such drastic action as to protect their good name and their patrons. It is felt that this one work, while it did not result in court actions, was just as effective in bringing about the selling of only good fish to the public. This does not mean that the chain stores were exempt from prosecution, for these were summoned into court as frequently and possibly more frequently than individual retail dealers. However, the idea of "showing them," it is felt, has been of immense service in the work.

Another instance of what this service has to do can be gleaned from its handling of cargoes of swordfish arriving from Nova Scotia. The Nova Scotian government has seen fit to subsidize gasoline propelled crafts to bring to the Boston market in proper season, cargoes of fresh mackerel, lobsters and swordfish. The object is to assist the fishermen to escape what some of them consider to be unbearable freight rates charged by the regular steamboats and train service.

It is not the intent here to discuss the merits of this part of the problem, but it is interesting to cite the fact that in at least two shipments of swordfish the plan came to grief, certainly at great expense to either the catcher or the shipper or both, although it has been commonly stated that some of the fish shipped were actually bought at the port of departure by local Massachusetts concerns. To state the point in brief, in one cargo of 373 fish, 24 of the same weighing 5,126 pounds were found to be unfit for food by a deputy inspector upon their arrival in Boston and were promptly condemned and action taken to see to it that these fish did not have an opportunity of reaching any consuming point. This case was on September 2.

On September 8 another cargo of Nova Scotian swordfish arrived at Boston,



there being 360 swords in the consignment. This lot proved to be in even worse condition than the one previously cited, because of the approximate 360 fish in the cargo it was found necessary to condemn as unfit for food 150 fish weighing 38,084 pounds. As swordfish at this time were worth 30 cents per pound at wholesale at the Boston Fish Pier it can be seen that the financial loss to those interested was considerable.

The fact is that these fish were collected at various points along the Cape Breton coast where they had been landed by the small fishing boats. After securing the same the fishing boat crews failed in what would be considered here as the proper dressing of the fish, and also used practically no ice in their preservation. These fish were collected by one of the subsidized Nova Scotian crafts and brought to the shipping point at North Sydney, Cape Breton, where they were placed in what is commonly termed by fishermen the "cooler," the object being not to freeze the fish but to keep them sufficiently to make their voyage to Boston in quality safety. Evidently the opposite was the result, because without question the fish, as far as these boat carriers were concerned, were splendidly iced, but it is a question if after being taken from the cooler and thus iced, this method of shipment did not almost immediately cause the fish to begin to "give up" and thus to sour and otherwise make them upon their arrival here unfit for food.

It should be noted in the case of the second shipment that the carrying craft broke down off the Nova Scotia Cape Shore and had to be towed to Boston the rest of the way, thus increasing the length of time in reaching market, which must have had its effect upon the goods. It is interesting to note that the landing of both of these shipments was supervised by the United States Customs officials as well as a deputy inspector from this office and visited from time to time during the discharge by commission dealers and other parties at interest, and in no case was a complaint made, — but only remarks that this office was doing what was only its duty. Even the captain and the owner of the vessels could find no cause for complaint as the result of the inspection. These two cases are cited as illustrating the variety of matters that come up in the daily work of the service, and further because of the size of the shipments and the large proportion of condemnations.

The general work of inspection of the some 2,000 retail stores in the State and the over 100 wholesale markets has been carried on as usual within the limitations of the number of deputies and the funds provided for the work.

The following table shows some of the work accomplished during the year 1930:

Inspections in retail stores, 3,923.

Inspections in wholesale stores, 20,724.

Freezer inspections, 290.

Inspection of pedlar's carts, 300 weekly.

Inspection at Yarmouth, N. S., steamer, 90.

Vessel inspections at Gloucester, 1,249.

General inspection trips, 7.

Fish condemned at Boston Fish Pier from fishing vessels, 2,000 pounds.

Fish condemned at retail stores, 2,068 pounds.

Condemned at Boston from consignments on Yarmouth, N. S., steamer and Nova Scotia freighting boats, 213 sour fish, 43,710 pounds; graded as "jellied" 40 fish, 11,831 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 6,172 pounds fresh fish; 260 pounds turtle; 65 pounds salmon; 1,008 pounds scallops.

Condemned, landed at Boston Fish Pier arrived by rail, 6,932 pounds of miscellaneous fish.

Condemned, landed at Boston Fish Pier, direct, graded as "jellied" 155 swordfish, 34,900 pounds.

Total condemned at Boston Fish Pier, and at Boston from Canada by rail and steamer, 106,878 pounds.

Total inspections, 26,276.

Total fish condemned, 108,946 pounds.

Total court cases, 45.

Total convictions, 43.

Space will not permit going into detail as regards the great advance in the production and shipping of filleted fish, which today is practically the backbone of the fish shipping business. These fillets are shipped not only to points within the State, but to New York, Washington, Chicago and the middle west and even to the Pacific coast. Upon the condition of these goods on shipment depends in a great measure the future prosperity of the Massachusetts fish industry. It emphasizes our earlier statement that more deputies are needed. It is absolutely necessary, if these fillets are to be of the quality to make Massachusetts fish stand out preeminent, that careful inspection should be made before they leave their base. As it is now, together with the other work of this office, it is absolutely impossible to give to this especial branch of the business the attention that it honestly should have.

For the first time, as far as known in the history of the fish business of Massachusetts, a local dealer was in receipt of swordfish actually taken in Japanese waters and there frozen and afterwards shipped from cold storage to the Boston Fish Market via Los Angeles, California. The consignment consisted of two cars containing a total of 216 fish in count. Because of the long distance between the point of capture and the port where they were to be disposed of (nearly half around the world), this office, as well as officials of the local food inspection bureau of the United States Department of Agriculture, located at a branch office in Boston, awaited the arrival of the consignment with much interest. The consignment arrived at Los Angeles on November 3, from Tokyo on the steamer "Chichilibu Runu" which had left Japan seventeen days before. From there the fish were sent in two cars arriving at Boston November 14, 1930.

A very rigid inspection was made of the fish by this office as well as by an official of the food inspection bureau of the local office of the United States Department of Agriculture, our deputy even going so far as to have some of the fish cut in order to ascertain their internal condition. The fish as a whole came through in very fine order, and, in fact, it was found necessary to condemn but one fish as being "jellied" and this was done on December 8 when some of the fish were put on the market. The fish condemned weighed 337 pounds.

#### STATE SUPERVISOR OF MARINE FISHERIES

In the period of little more than a year that the office of the Supervisor of Marine Fisheries has been in existence every effort has been made to bring this important section of the Division of Fisheries and Game into closer contact with the industry. The Supervisor has been confronted during his first year with a great number of intricate problems in connection with the fisheries, many of which problems had scarcely been touched upon in the past. The vastness and complexity of the fisheries themselves constituting as they do, one of the richest fields in the world; the problems connected with polluted areas of the State's most valuable shellfish; the conditions of the fishing grounds near shore; problems of law enforcement made more difficult by the accumulation of complex revisions over many years; the delicate inter-relation of State and town supervision of certain sections of the tidal waters requiring numerous conferences, — all of these, added to the task of organization, have prevented as rapid progress as desired. Particularly as the personnel of the office force consisted of only one clerk until near the end of the fiscal year when authorization was secured for the appointment of one person to be biologist and statistician. Up to the present writing this post is only filled provisionally awaiting action upon the part of the Division of Civil Service.

The policy of the Supervisor, rigidly adhered to, of courteous cooperation, we feel has resulted in the removal of most of the friction naturally attendant upon so many conflicting viewpoints and it is evident that this spirit is reciprocated in the steady influx of inquiries and visits from city and town officials, representatives of fishermen's associations, fishermen, and others who are interested in the various problems of marine fisheries which the Supervisor is called upon to handle.

A special effort has been made to enlist the interest of the towns toward broader and more practical policies of conservation. Advice emanating from this office



on shellfish conservation, proper handling of contaminated areas in the various sections, and better marketing policies for local products, is daily adding considerable revenue to the various localities. This work is, however, only in its infancy and will be greatly extended in the future when adequate facilities are obtained for demonstrating, by experiment, solutions for some of the local problems of the individual towns.

One of the special lines of research which it is hoped to take up this coming year is the determination of the causes for the tremendous mortality of clams in certain areas. There are thousands of acres in unpolluted areas in certain section of the State, capable of producing a tremendous quantity of soft shelled clams, in which the clams will grow well until they nearly reach a marketable size, and then, for some unknown reason, they will begin to die in alarming numbers until the beds are quite depleted. A biological survey of these flats is contemplated and an effort will be made, in cooperation with the various towns in which these areas lie, to devise some method of improving this situation.

The very much desired entrance into the field of bio-statistical research in the various branches of marine fisheries has been delayed through lack of proper equipment. A beginning, however, has already been made, and with a permanent appointment which may soon be effected, it is hoped to build up a system of reliable figures on this very important phase of the industry.

Due to the accumulation over a number of years of various special and general laws the marine fisheries code had become an almost hopeless tangle, making reasonable enforcement quite difficult. Chapter 28 of the Resolves of 1930 provided for a survey and revision by a special commission of the laws of the Commonwealth relating to marine fish and fisheries, including shellfish. The commission which was set up early in the year has held many hearings and has gone very carefully into the various problems presented. The supervisor is a member of this commission.

The marine fisheries of the Commonwealth constitute a very important part of the total wealth of the State and make a most important contribution to its annual income. A complete census of the various branches of these fisheries including invested capital and the market value of the annual "Harvest of the Sea" would reach a most astonishing figure, and would still be incomplete unless there was also included the tremendous quantity of supplies, equipment, refrigerating machinery, and transportation necessities. Massachusetts lies at the gateway of one of the richest fishing areas of the world. In addition to her shore fisheries, which are in themselves a resource of great value, an area of 63,000 square miles of fishing grounds is within 200 miles of her ports, and one-third of this area is within 100 miles of Boston. A complete census of the entire subject has never been made. The ground work for such a tabulation has been begun, and it is our intention to complete it as rapidly as possible and by systematic collection have at hand at all times a complete account, the final figures of which will not be more than a month old.

Without attempting to go into all the detail of the various lines of fishing activities in the State, the figures for which are not at present available, we are giving the following summary of the value of the most important branches of the fisheries for the year 1930 as it appears from our present records. These figures give the tremendous total of \$20,930,012 as a conservative estimate of the value of the fisheries of Massachusetts in 1930.

*Estimated Value of Fishery Products of Massachusetts, 1930*

Vessel landings at the port of Boston . . . . .	\$10,424,165
Vessel landings at the port of Gloucester . . . . .	3,556,923
Vessel landings at the ports of New Bedford and Woods Hole . . . . .	421,608
Shipped direct to New York <sup>1</sup> . . . . .	904,824
Shore net and pound fishery . . . . .	321,858
Local catch of lobster fishery . . . . .	777,633

<sup>1</sup> Conservative estimate from reliable sources.



*Estimated Value of Fishery Products of Massachusetts, 1930 — Con.*

Soft shell clam fishery <sup>1</sup>	\$2,243,648
Quahaug fishery <sup>1</sup>	978,197
Shallow water scallop fishery <sup>1</sup>	667,075
Sea scallop fishery <sup>1</sup>	250,000
Oyster fishery <sup>1</sup>	170,000
Razor clam fishery	25,956
Sea crab fishery	148,750
Bait worm fishery	39,375
<b>Total</b>	<b>\$20,930,012</b>

<sup>1</sup> Conservative estimate from reliable sources.

In addition to the fishery products, according to the above list, which were taken by Massachusetts fishermen, it was found necessary to ship into the State the following fishery products:

*Canadian Lobsters:*

Direct	7,943,711 lbs.	valued at \$2,383,113
Indirect	2,229,578 lbs.	valued at 668,873
<b>Total Canadian Lobsters</b>	<b>10,173,289 lbs.</b>	<b>valued at \$3,051,986</b>
Clams from the State of Maine	225,000 bus.	valued at 675,000
Clams from Nova Scotia	20,497 bus.	valued at 40,994
<b>Grand Total</b>		<b>\$3,767,980</b>

*Enforcement of Marine Fisheries Laws*

A regular force of nine coastal wardens was employed in 1930 in the enforcement of the laws relating to marine fisheries and shellfish. These were allocated along the coast of the mainland only, as the warden force was too small in number to assign any of them to the islands of Martha's Vineyard and Nantucket. The supervision of the marine fisheries work in these latter places was taken care of by the local inland wardens.

The wardens in addition to their regular patrol work assisted in the field work; reported on the condition of fishways, or cleared out passageways for the fish when obstructions were slight; attended meetings of fishermen's organizations for the purpose of giving information on fisheries matters; throughout the year collected data and statistics on the fishery activities in their district; and many kindred duties.

In addition to the coastal wardens a number of deputy wardens were appointed to work with and assist the regular wardens in special duties. The number of these wardens appointed for the coastal service in 1930 was 46.

These deputy wardens fall into three general classes: One group is appointed at the request of aldermen or selectmen and given the power of State wardens although under salary from the city or town. Another group is also appointed with the approval of the city and town authorities to supervise the digging and transferring of clams from the contaminated areas to the chlorination plants for purification purposes. These deputy wardens are under the general supervision of the coastal warden and are required to make regular reports on the amount of clams taken or transferred from the areas in which they are located. A large quantity of shellfish was thus rescued from the polluted areas and purified for consumption as food. A few deputy wardens were also appointed at the request of various local associations of lobstermen for the purpose of assisting the wardens in the correction of certain local conditions. Although these deputies lacked the training and experience necessary to make them capable enforcement officers, they did assist, in some instances, in curbing a certain class of violations. Furthermore,

a better understanding was fostered through this cooperation between the lobstermen and the State.

The court work for the year was as follows: — Number of cases entered, 268; convictions, 254; discharged, 14; filed, 25; appealed, 6; the amount of fines imposed, \$3,831.

The following classification is made of cases brought into court:

Nature of Offense	Number	Fine
Taking shellfish from contaminated areas . . . . .	170	\$2,595.00
Illegally transporting shellfish . . . . .	5	130.00
Possessing undersized clams . . . . .	17	138.00
Possessing undersized quahaugs . . . . .	27	150.50
Possessing seed scallops . . . . .	7	64.50
Possessing short lobsters . . . . .	11	548.00
Taking scallops in closed season . . . . .	7	15.00
Setting lobster pots without a license . . . . .	2	25.00
Illegally possessing egg lobsters . . . . .	1	10.00
Illegally mutilating a live lobster . . . . .	1	50.00
Interfering with lobster gear . . . . .	2	35.00
Illegally dragging in Cape Cod Bay . . . . .	3	60.00
Taking shellfish from private grants . . . . .	1	10.00
Total . . . . .	254	\$3,831.00

## THE DEEP SEA FISHERIES

### *Cape Cod*

Generally speaking, the fishing season off Cape Cod may be considered as fair and above the average of the past five years in the total poundage of fish and actual returns to the fishermen. To be sure, the fish mainly relied upon in the past — flounder, haddock, and cod — were not in the usual abundance and the price of all fish was particularly low. This situation was offset by the unusually good catches of whiting, blue fish, striped bass, butterfish, squid and mackerel.

Part of the success of this season must be attributed as much to the resourcefulness of the fishermen as to the abundance of the fish. Larger and better equipped boats have enabled the enterprising fishermen to abandon the usual form of fishing when it ceases to be remunerative and take up some other fishing activity which brings better returns.

The following general notes on the more important fish gives a good running account of the season on the Cape.

*Flounders* were not plentiful at any time of the year. It is estimated that the shipment this past winter was about twenty-five hundred barrels less than the previous year. The fish were so small as to be undesirable in the market, and the fishermen received little more than the expense of shipping. Some of the larger boats stopped dragging early in the winter and were fitted out for catching scallops. This was a new venture, but the crews shared about twice as much as those which continued dragging for flounders.

A fair amount of *codfish* was taken off Plymouth by the draggers, and the returns on these fish were somewhat higher than on flounders. During the summer the draggers usually depend upon catching *haddock*, but this past year the catches were considerably below average, and as prices were also low, most of the boats turned to the more profitable work of swordfishing. This was again a new line of fishing for many of them, but was quite remunerative.

The fleet of *line trawlers* off Provincetown made some very good catches of cod and haddock. This fleet is increasing in number every year and the boats they are building are much larger and equipped with more power. Most of the boats are from 30 to 32 feet in length, are equipped with powerful engines, usually more than 100 h.p., and attain a speed of about 18 miles per hour.

The largest one of the fleet is 35 feet long and is equipped with 150 h.p. engine. These boats are capable of going considerable distances from shore, and this past year they fished from South Channel to Boone Island and had a very successful year.

*Mackerel* were plentiful in these waters but stayed well off shore, very few coming into Cape Cod Bay. The netters at Hyannis did very well in the month of May and caught large numbers of mackerel in anchored nets, but the price remained low and the returns were very small. In the Bay the draggers fared a little better because they were able, on account of the short distance, to land their catch right at the freezers, which considerably lessened the expense. However, the price at the freezer remained very low due to the receipt of large quantities of mackerel from the boats offshore.

*Herring* were not as plentiful as in the past and there was a decrease of about 50 per cent from the catch of the previous year. The spring run of herring was only about half the usual size, but were suitable for bait. Herring of the small sardine size were very plentiful, in fact too plentiful, as the food market for these fish is quite limited, and with such a large supply and the demand quite small, the price dropped to such an extent that the fishermen could only get enough for them to cover the expense of shipping. The fall run of herring did not occur this year, but for about two days the traps got a few herring, about half the usual size, which were sold to the freezers. There were many small *blue backs* in the Bay this summer but most of them were too small for bait. A few were sold to dealers for curing.

*Squid* did not arrive on the Cape quite as early as usual, coming late in August, but they continued plentiful all fall. There was no extra large run of these fish but there was a plentiful supply throughout the season. The number of squid present in the traps was very helpful to the line trawlers, as otherwise, there would have been a shortage of bait. A good average catch of *bone squid* was made at Chatham this past year, and added considerable revenue to the fishermen.

For the first time in many years there was a large run of good sized *bluefish*. For the past two years the bluefish which have been caught were small, seldom weighing over two pounds, but this past year many were caught off Chatham that would weigh 5 pounds or better. These fish were all caught on drails as none of the fishermen were equipped with proper seines for catching them.

Double the number of *striped bass* were caught about Cape Cod in 1930 as in the previous year, and especially good catches were made in the traps at Provincetown. The fishermen at Wellfleet also made good catches with drag seines and the sportsmen had a wonderful time catching them from shore — standing right in the surf. They were plentiful from Race Point to Monomoy. Fish caught by the sportsmen were of good size. The largest one reported weighed 33 pounds and was caught off Race Point Light.

There was an increase of about 15 per cent in the catch of butterfish this past year, and in September there were quite a number of large ones, known as "jumbos," mixed in with a considerable number of small, "dollar size". The large fish brought good returns to the fishermen, while on the smaller ones they barely cleared \$1.00 per barrel.

*Whiting* increased about 100 per cent over the catch of last year. After the fresh fish market had taken all they could use, the freezers in turn were completely filled with whiting. Some of these fish were consequently taken by boat to the Boston and Gloucester freezers, and fully as many more were dumped over the edge of the traps.

*Dog fish*, preferably called *gray fish*, were numerous all along the coast throughout the year and caused considerable trouble to trawlers, seiners and netters.

#### *Buzzards Bay*

The receipts of fish at the two principal ports in Buzzards Bay — Woods Hole and New Bedford — continued to decrease, particularly in the amount of finny fish. The growing practice by the fishermen of taking their catch directly to



market is responsible for this, and much of the catch reaches these ports only when storms drive the boats into harbor.

In the amount and variety of fish handled, New Bedford seems to be rapidly forging ahead, especially in the amount of shellfish. Approximately one-half of the total amount of scallops caught in Massachusetts waters passes through New Bedford. A large portion of the swordfish caught off the southern shore is also brought to this port and finds a ready market locally, *i.e.*, New Bedford, Fall River and Providence. The boats of the mackerel fleet put into New Bedford frequently, and this past year more mackerel were landed at this port than for the past ten years, in spite of the fact that the fall run of mackerel missed this section.

Handline fishing for scup was very successful in Buzzards Bay, but, due to the large quantity shipped in from southern waters, the price was very low. The catch of bluefish was considerably increased both in size and number over last year. Drailing was very successful, and one seiner brought in 20,000 pounds of bluefish in one trip. This amount was more than the total number of pounds previously caught over a period of many years. Some good catches of tautog were made by the handliners but the total amount taken was only about average.

### *Martha's Vineyard Activities*

Taking into account all phases of the fishing activities at Martha's Vineyard, the season of 1930 must be considered as quite poor when compared with the normal output of this island a few years ago. Yet the amount of fishery products this past year averaged well with that of the past five years and was slightly better than in 1929. In common with the fisheries generally throughout the State, the ready marketing of fish formerly considered of little value resulted in giving the fishermen much better returns for their season's work than would otherwise have been the case.

As in previous reports, the fisheries of Martha's Vineyard, which naturally fall into two rather distinct divisions, are referred to as fisheries of the eastern and western ends of the island.

At the eastern end of the island the catch of *cod* and *haddock* continued to be meager and the amount taken was reported as about half that of normal years. *Flounder* fishing near the island was very poor and was described as about one-eighth of a normal amount. In the catch of flukes there has been a steady decrease for the past five years, and a still further decline was noticeable this past year. *Yellowtails*, on the other hand, were very plentiful, but the increased catch was due in no small measure to the failure of the flounder supply which resulted in more intensive fishing for yellowtails. This change-over was further favored by the increasing trade in filleting. More than 600,000 pounds of yellowtails were taken at this end of the island, and more than half of this amount was carried to market in the fishing boats. Undoubtedly a much better season would have resulted had not the fish arrived on the grounds unusually late. About an average amount of *scup* was caught, with the price continuing quite low. Striped bass were also somewhat late in arriving and were not quite as plentiful at this end of the island as last year. *Clams* continued to fall off in amount, and the catch of quahaugs and little necks was only slightly under that of 1929. *Scallops* were quite plentiful and prices were good, but the large number of men engaged in the industry prevented the season from being as remunerative as it might otherwise have been.

At the western end of the island there was a decrease in the amount of fish caught. About the only fish occurring in good number was the squid, and as prices were quite low they were of very little value to the fishermen. *Butterfish* were a little more abundant than other species but were not quite as plentiful as last year. In common with other sections of the State, bluefish were quite abundant and good catches were made by drailing. Mackerel were quite plentiful in the early part of the season but left these waters about September first, apparently driven off by bluefish and bonitos. In direct contrast with the neighboring island of Nantucket squiteague were very scarce at the western end of the island.

### Nantucket

The fishing season at Nantucket was, generally speaking, fairly successful.

The catch of flounders was less than usual. The inshore fishing for them was carried on mainly at Hawes Shoal and was considered quite poor. Exceptionally strong tides were held to be mainly responsible for this, as experience seems to indicate that few flounders are caught whenever high course tides occur. Many of the flounder fleet were fishing on Georges Bank, from which place they carried their catches directly to the New York markets.

Very few *swordfish* are shipped from the island, practically all of the boats preferring to take their fares to the markets in their own boats. A fairly good catch of swordfish was reported by such local boats as are equipped for this sort of fishing. During the summer a 300-pound swordfish was caught in the harbor of Nantucket where it had come apparently in pursuit of other fish.

Good catches were made of *squeteague*, or weakfish, in the summer and early fall, and they were considerably larger than those caught last year. In 1929 there were many squeteague about the island, but most of them weighed around two pounds, while this past year many of the fish weighed from six to eight pounds. Every sign points to an increased catch of these fish next year.

*Mackerel* were reported more plentiful around Nantucket than usual, especially in September and even later. Unusually warm weather is probably responsible for their late stay in these waters. Prices, however, were quite low, and the fishermen were not very zealous in going after them. Most of the mackerel are taken direct to market.

*Codfish*, usually fished for at the Rips, were not nearly as plentiful as usual.

*Yellowtails* were quite abundant, but the season at Nantucket is very short, lasting only about six weeks, and then the fish migrate to the vicinity of Edgartown. These fish appeared at the island a little later than usual.

*Bluefish* were very plentiful and were much larger than those taken in the previous year. Where the average, in 1929, was from five to six pounds, this year the average was about seven and a half pounds. Practically all of these fish are caught by drailing and they were abundant along the entire south shore of the island.

*Striped Bass* were also unusually plentiful and were reported "lying black" at Smith Point and the islands of Tuckernuck and Muskeget.

*Alewires* were caught in great quantities while running up from Maddaket Harbor into Long Pond. Hundreds of barrels were taken, most of which were salted for bait.

It is very difficult to correctly estimate the amount of fish and shellfish taken at or near Nantucket. The captains of the boats and shippers believe that fully three times the amount shipped by the New England Transportation Company are carried by the fishermen to the various markets in their own boats. We furnish, however, the following figures as a very conservative estimate of the amount of fish and shellfish taken at Nantucket in 1930:

Fish, by steamer . . . . .	3,770,100 pounds
Fish, direct . . . . .	11,310,300 pounds
Quahaugs . . . . .	11,353 barrels
Scallops . . . . .	25,256 gallons
Scallops in shell . . . . .	500 barrels
Conchs . . . . .	100 barrels

Estimated Value: fish, \$754,020; quahaugs, \$68,700; scallops, \$100,000; conchs, \$500; total value, \$923,220. The above list does not include the shipments of eels, the amount of which is considerable but upon which an estimate could not be obtained.

The fish traps at Great Point had a very good season. The catch included among the principal fish, in order of abundance, butterfish, bonito, mackerel, squid, dogfish, scup and bluefish. No sturgeon or shad were taken in the traps this year. The amount of these fish is included in the account of the Net and Pound Fisheries.



*Port of Boston*

We are fortunate in having for another year a brief résumé and comment on the activities at the Boston Fish Pier by Mr. F. F. Dimick, the able secretary of the Boston Fish Bureau, who is an unquestioned authority on the subject by reason of years of experience.

We take pleasure in quoting Mr. Dimick as follows:

"During a year of tariff revision, business is usually at a low ebb. As fish is an economical and wholesome food it is only logical that in a period of depression it should be in good demand. Products of the farm and stockyard, however, have sold at the lowest prices of years. Prices of fish have held up remarkably well, but business in fish has not been immune from the depression.

"It is gratifying to note the interest being shown in the problems confronting the commercial fisheries, and the improvements in merchandising manufacture, and other matters in relation to the progress of the fish trade and industry.

"More haddock are landed at Boston direct from the fishing fleet than at any other port in the world. For nine consecutive years the receipts of groundfish at Boston have made a new record. The week ending February 27, just previous to the opening of the Lenten season, there were 147 arrivals, having a total catch of 9,037,600 pounds of groundfish, a new record for one week. The biggest week the previous year was that ending March 28, when there were 139 arrivals, 7,843,850 pounds. Monday, February 24, there were 59 arrivals having 3,522,200 pounds of groundfish, of which 2,365,000 pounds were haddock, and this comprised a record for one day in the receipts of groundfish.

"While good catches of fish were landed in the spring of the year the catch made during the summer and fall have been light, and the fishermen report fish scarce. The catch of market codfish shows an increase, as during the summer good catches of these fish were landed from South Channel and Georges Bank. In July, August, and September the fishermen landed good catches of hake from Georges Bank and South Channel, and the receipts of these increased compared with the previous year. Owing to a smaller fleet, that operated on the eastern banks, and the scarcity of fish, the receipts of halibut direct from the fleet declined. Halibut have, however, been in good supply from the West Coast.

"The catch of mackerel to December 1 amounted to 42,480,429 pounds compared with 42,524,920 to corresponding date in the previous year. The indications were that very few mackerel would be landed this year after that date.

"The amount of salt mackerel landed by the fleet has been negligible and the fishermen have practically quit salting mackerel at sea. During the season when fresh mackerel were in over supply some were salted, but small in quantity compared with last year.

"The southern mackerel fleet of seiners numbered about 52 sail, the largest fleet for a number of years.

"The first catch of mackerel was landed at Cape May, April 11, Schooner Shirley N. Clattenberg, Capt. Howard Parsons, having 1,000 pounds of net mackerel. The first mackerel the previous season were landed at Cape May, April 8, by the Schooner Lois H. Corkhum, Capt. William Corkhum, 2,000 pounds seine mackerel, weighing about two pounds each. This is the first time in the history of the southern mackerel fishery that the first catch of mackerel was landed by a netter.

"Probably the biggest day ever experienced in the southern mackerel fishery at Cape May was Monday, April 21, when 33 vessels arrived having half a million pounds of mackerel, mostly one-pound fish.

"Schooner Fannie Powell, having 10,000 pounds of mackerel, and Antonia, 11,000 pounds mackerel, arrived at Boston from the South, May 6, were the first direct arrivals and sold to wholesale dealers at 7¢ per pound. The previous year the first arrival, April 29, the Angie & Vence, 40,000 pounds sold at 10½¢ per pound.

"As mackerel were quite plentiful on the shore only a few vessels went down to Cape Shore. Three arrivals from there landed a total of 112,000 pounds large fresh mackerel. A few more vessels went to that shore, but experienced foggy weather and did not make any catches.



"Filletted salt mackerel is a new product of the mackerel fishery, and we are informed have been in good demand. Only a small amount of these fish were packed, but more will probably be put up in the future.

"The foreign receipts of lobsters improved about 30% due in a large measure to the inauguration of a new steamship service from Nova Scotia ports assisted by the Canadian government, that enabled the fishermen at eastern Nova Scotia ports to ship their catches to this market.

"An effort was made to introduce Japanese scallops into this market, a shipment of which was received in February of 800 five-pound boxes via West Coast. They were larger in size than the Atlantic coast scallop, of a yellow color, but said to be good eating.

"The close season on halibut on the Pacific coast ended February 15, but was extended two weeks by mutual consent in order to facilitate the sale of the large stock of frozen halibut on hand, the prices of which were reduced to the lowest figure for a number of years.

"In an agreement between United States and Canada for the preservation of the halibut fishery, the close season for halibut fishing which had been from November 16 to February 15 was changed to November 1 to February 15. The new convention is concluded for a period of five years.

"The receipts of fresh swordfish from California the past season amounted to two cars, compared with seven the previous season. The small receipts this year were due to a light catch of these fish on that coast.

"A car of Japanese swordfish was received in this market recently via West Coast.

"The herring season at Bay of Islands, Newfoundland, during the winter of 1929-30 was the worst in the present century, amounting to 16,903 barrels, including 9,864 barrels salt bulk, 844 barrels pickled and 5,117 barrels Scotch cure. The previous season the total amounted to 35,414 barrels, which included 14,307 barrels salt bulk.

"Up to December 1st, 17 fishing vessels were lost, two of which were steamers. Six of these vessels were stranded, 7 destroyed by fire, 3 sprung a leak, 1 cause of loss unknown.

"The receipts of swordfish amount to 22,352 fish, compared with 27,848 the previous season. The catch of these fish on Georges Bank was light compared with the previous season, but fishing to the eastward was better and continued later than usual. The foreign receipts were a little larger than in the previous season.

"During the year 1930 prices of fish ex vessel in general has ruled low, and the season has not been a very profitable one for the fishermen or the producer.

"The catch of fish in the Cape Cod traps was light with the exception of whiting."

The number of vessels engaged in the various branches of the fisheries that landed fish at Boston for the past five years, was as follows:

	1926	1927	1928	1929	1930
Draggers (large and small) . . . . .	89	166	182	198	202
Steamers . . . . .	28	25	41	60	89
Line vessels (hand liners and trawls) . . . . .	107	105	72	66	82
Swordfish . . . . .	40	79	79	76	87
Mackerel . . . . .	108	102	113	103	112
Halibut . . . . .	20	20	23	17	18
Total . . . . .	392	497	510	520	590

RECEIPTS OF FISH AT BOSTON DIRECT FROM THE FISHING FLEET FOR A PERIOD OF FIVE YEARS ENDING  
NOVEMBER 30, 1930

	1926 (Pounds)	1927 (Pounds)	1928 (Pounds)	1929 (Pounds)	1930 (Pounds)
Large Codfish . . . . .	31,384,778	29,894,368	24,426,905	23,576,163	23,834,885
Market Codfish . . . . .	9,282,793	10,738,328	15,406,558	15,786,557	26,499,149
Cod Scrod . . . . .	102,320	113,885	87,890	280,386	169,980
Haddock . . . . .	79,549,563	97,014,734	121,587,472	153,624,371	160,665,853
Scrod Haddock . . . . .	9,829,783	14,608,529	12,143,585	9,647,206	8,209,927
Hake . . . . .	3,213,105	3,485,099	5,663,183	10,567,876	13,764,080
Small Hake . . . . .	1,244,727	8,835	73,000	3,420	81,530
Pollock . . . . .	2,674,450	3,419,300	2,954,785	4,286,822	4,821,757
Cusk . . . . .	1,452,000	2,288,056	1,560,014	2,170,200	3,819,348
Halibut . . . . .	2,818,086	4,112,746	3,286,376	2,609,119	2,499,011
Mackerel . . . . .	23,708,292	20,091,120	15,114,960	21,232,279	23,606,198
Swordfish . . . . .	2,378,980	2,141,082	2,263,437	4,096,085	3,078,088
Miscellaneous . . . . .	5,390,500	9,114,389	8,106,759	11,675,599	14,297,200
Total . . . . .	164,029,377	197,030,471	212,674,924	259,556,083	285,347,006

*Gloucester*

As for the catch of the Gloucester vessels for the year, it can be called satisfactory, but the financial returns were not commensurate with the great expense in the catch, therefore the year, from the standpoint of the vessel owners, cannot be considered or recorded as having made a satisfactory showing.

From the viewpoint of the shipper of fish and the manufacturer, the general depression which has existed all over the country in business lines has caused a restricted market, which, while it has not resulted in the carrying over of large stocks of fish, has caused 1930 to be recorded as not a very successful year. Indeed, if one were a pessimist even stronger terms might be used.

And yet with the backing of seven or eight years of continued prosperity behind them, the fishermen, the captains and the fish dealers of Gloucester are facing 1931 with a feeling of confidence that the worst is over and a renewal of good times is only in the offing.

In common with the fisheries of our entire coast, there has been a steady increase in both the number and size of the vessels employed in the Gloucester fisheries. Although the amount of fish landed in 1930 was less than in the previous year, nevertheless it was found necessary to go farther offshore and spend more hours of trawling to bring in the fare. This fact should be taken into account in any interpretation of the figures.

The following table gives the landings by American fishing vessels at Gloucester as reported by the United States Bureau of Fisheries from December 1, 1929, to November 30, 1930.

*Table of Landings by American Fishing Vessels at Gloucester, 1930*

	Pounds
Cod, fresh:	
Large . . . . .	7,227,236
Market . . . . .	2,271,067
Scrod . . . . .	20,120
Cod, salted:	
Large . . . . .	1,335,845
Market . . . . .	534,122
Scrod . . . . .	201,454
Haddock, fresh:	
Large . . . . .	13,374,649
Scrod . . . . .	748,893
Hake, fresh:	
Large . . . . .	1,532,581
Small . . . . .	17,185

Hake, salted:	Pounds
Large	4,230
Pollock, fresh <sup>1</sup>	8,943,025
Pollock, salted	3,155
Cusk, fresh	374,010
Cusk, salted	18,052
Halibut, fresh	22,686
Halibut, salted	2,995
Herring, fresh	77,400
Herring, salted	2,771,048
Flounders	1,031,714
Mackerel, fresh	8,981,620
Mackerel, salted	35,530
Swordfish, fresh	2,773
Other, fresh	197,385

Total, fresh, 44,822,344 lbs. valued at \$1,258,332.

Total, salted, 4,904,431 lbs. valued at \$213,741.

Grand Total, 49,726,775 lbs. valued at \$1,472,073.

This table shows that, in 1930, there was a decrease of more than 3,500,000 pounds in the total amount of fish landed in Gloucester when compared with the account of 1929, the figures for which were obtained from similar sources. Lower prices, amounting to about 1¢ per pound, indicate a decrease in value of more than \$35,000. The amount of fish graded as "Salted" showed, on the other hand, an increase of 733,382 pounds. As indicated in previous reports, in addition to the amount of fish listed in the above table a considerable number were landed in Gloucester from other sources.

A conservative estimate of the amount of these fish, secured from reliable sources, is as follows:

	Pounds
United States unregistered crafts under 5 tons	6,500,000
Cured fish from Maine ports	2,362,904
Fish, not the product of American fisheries, and also from Treaty coast	14,417,362
Fresh fish trucked to Gloucester from the Boston Fish Pier	9,500,000
Total	32,780,266

These fish brought higher prices than the landings listed in the preceding table and may be valued approximately at \$2,084,850. Adding this amount to the value given in the table of "Landings" we have a total listed value of \$3,556,923.00, which should be considered as a quite conservative estimate of the value of the fisheries industry of Gloucester.

## SHORE FISHERIES

### *Shore Net and Pound Fisheries*

The following summary of the reports of the shore net and pound fisheries is given as required by section 148, chapter 130 of the General Laws:

Number of men engaged, 237; number of boats, 136; value of boats, \$66,430.00; number of fish pounds, 101; value of fish pounds, \$290,901.35; number of nets, 120; value of nets, \$1,850.00; value of shore and accessory property, \$75,486.85; total catch in pounds, 13,997,765; value of fish, \$321,858.94.

<sup>1</sup> The large amount of fresh pollock listed here was greatly augmented by the extraordinary catch of these fish in the month of November when 4,700,075 lbs. were landed. Most of these fish were taken by the gill netters.



TABLE SHOWING CATCH OF VARIOUS FISH, 1926 TO 1930

	1926	1927	1928	1929	1930
Alewives . . . . .	147,793	82,562	52,656	17,036	23,958
Bluefish . . . . .	11,071	7,396	4,539	6,808	13,318
Butterfish . . . . .	-	-	-	63,972	277,073
Cockles . . . . .	-	-	-	-	44,000
Cod . . . . .	-	-	-	28,748	60,394
Eels . . . . .	-	-	-	-	11,737
Flounders . . . . .	109,896	75,254	6,221	4,546	17,262
Herring . . . . .	20,074	743,462	330,865	1,105,359	2,858,223
Horse Mackerel . . . . .	-	-	-	-	71,045
Mackerel . . . . .	647,536	727,240	704,310	807,463	1,064,645
Pollock . . . . .	17,516	1,136	5,769	50,393	197,630
Salmon . . . . .	178	40	-	-	150
Sand Eels . . . . .	-	-	-	-	1,106
Sea Bass . . . . .	3,712	3,332	1,256	-	2,010
Sea Robins . . . . .	-	-	-	-	6,600
Scup . . . . .	74,857	112,047	27,772	8,141	4,633
Shad . . . . .	12,583	5,592	8,630	3,936	4,861
Squid . . . . .	1,089,988	850,575	1,394,285	1,132,040	2,225,356
Squeteague . . . . .	1,199	3,279	15,998	969	932
Striped Bass . . . . .	380	4,095	21	-	8,551
Tautog . . . . .	17,557	25,084	32,583	10,174	12,697
White Perch . . . . .	-	-	-	-	6,000
Whiting . . . . .	-	-	-	759,915	6,263,316
Miscellaneous . . . . .	3,864,149	1,958,117	1,446,785	321,353	731,709
Total . . . . .	6,918,489	4,599,214	4,031,693	4,320,852	13,997,206
Value . . . . .	\$146,869.36	\$126,555.66	\$106,826.15	\$91,030.51	\$321,858.94

*The North Shore*

The lobster fishery is without doubt the most important branch of the fishery at present along the North Shore, employing 314 men, about one-third of the total number of men licensed in the State. The average catch per lobster pot for this district was 45.5 pounds and is considerably higher than the reported average of the entire New England coast. The number of egg lobsters and undersized lobsters returned to the waters by the fishermen gives promise of a continuance of good catches. One problem which has been emphasized by more than one lobster fisherman is the alleged injury caused to the feeding grounds of lobsters and fish generally by continually dragging over the bottoms with heavy trawls. This is not a new problem and is well worth serious consideration. Some of the fishermen are convinced that dragging should not be permitted near shore.

The clam situation along the North Shore is very serious at present, due to the extensive areas now under ban as contaminated. Much has been done to relieve this condition through purification at chlorination plants, but there still remains much to be done in the way of relieving the situation.

Trap fishing on the part of the few traps set in this area was quite poor, and trawling was only a little better. Late in the fall the gill netters off Gloucester made some unusually good catches of pollock.

*The South Shore*

Fishing along the shore line to the southward of Boston Harbor was considered in 1930 a little better than last year. To be sure, the success of the season's work depended, as elsewhere, on the resourcefulness of the fishermen in abandoning a branch of fishing when it brought poor returns and entering another line which would be more remunerative. Codfish were a little more plentiful, while haddock were considerably less. Mackerel were abundant but stayed well offshore for the greater part of the time.

Soft shelled clams and razor clams are about the only mollusks in this district. The former were not plentiful, due somewhat to polluted areas, but there were good sets of razor clams in the few areas where they are found.

## THE LOBSTER FISHERY

A total of 875 reports on the season's catch of lobsters were received from the lobstermen as required by law and are tabulated in the accompanying table. The returns are given for the entire State, and also by counties. Inasmuch as the reports from nearly 200 lobstermen have not as yet been received this table does not present as complete a picture of the lobster industry as desired. This number of reports, however, represents 81 per cent of the total number of licenses issued and is sufficient to show the trend of the season. An effort will be made to get the remainder of the reports at an early date.

From the figures contained in these reports and from the comments of the fishermen a fairly good idea may be obtained of the condition of the lobster industry of this State.

Attention is first directed to the average number of pounds per lobster pot. For the entire state there was a reported average of 41.3 pounds per lobster pot. This in itself would indicate that the lobster fishery was in a quite satisfactory condition. The average number of pounds per pot for the whole New England coast, according to the latest figures of the United States Bureau of Fisheries (1928), was 37.8 pounds. Since that year the Bureau of Fisheries has reported a general decrease in lobsters along the New England coast. Further examination of the figures shows a fluctuation from 8.8 pounds in Suffolk County to 56.4 pounds in Dukes County and 58.5 pounds in Plymouth County. These figures for the various counties are what might be reasonably expected from the location of these areas.

The total number of lobsters reported was some 603,000 larger than the reported catch of 1929, but when we consider the larger number of returns obtained this year we find that the catch has remained about the same, although perhaps slightly increased. The comments of the fishermen support this view. Although, as stated in previous reports, there is a wide divergence of opinion, some fishermen reporting that lobsters were considerably more plentiful and others that they were decidedly less than in the previous year, nevertheless a majority of the experienced fishermen believed that the catch of lobsters slightly exceeded that of 1929.

One particularly bright spot in the lobster industry is the increasing number of lobstermen's associations. As we pointed out in our report for 1927, all efforts to assist the lobster industry would be futile until the lobstermen themselves took an active interest in the subject. We believe that this increase in interest is evidenced by these organizations and the project has our entire support. To be sure, among such a large number of fishermen there will be, from time to time, divergent views, but we believe that in the end the organizations will support such conservation policies as may be proven to them as reasonably agreeing with their experience.

The attitude of the lobstermen generally on the present conservation policies as revealed in their comments may be summarized as follows: The policy of returning undersized and egg lobsters to the water they believe is essential for maintaining the supply of lobsters and believe, further, that the penalties for violating these practices should be more severe; a more satisfactory method of measuring lobsters is favored; a larger warden force equipped with boats suitable for inspecting the lobstermen on the fishing grounds was further recommended; from all sections we find that a duty on Canadian lobsters is strongly favored. Another recommendation very frequently appearing in their comments was the severe penalties for those found stealing lobsters from another's lobster pots.

We desire to call attention particularly to the facts concerning the shipment of lobsters from Canadian waters. From the tabulation of all the data we were able to secure we found that in 1930 a total of 10,173,289 pounds of lobsters were shipped into Boston, directly or indirectly, from Canadian provinces. The prices paid to Canadian fishermen according to Canadian government reports, were sometimes as low as 8¢ per pound and averaged in 1928 only 15¢.

We favor the adoption of a more efficient method of measuring lobsters to determine their legal length, and believe that the plan of taking, as a standard, the length of the body shell from the rear edge of the eye socket, has advantages which is had by no other method. Aside from providing an easier method of

measurement the particular advantage of this plan lies in the fact that it provides an absolutely uniform standard of size, which is in reality all that is intended by the law. An effort should also be made to have a similar method of measuring lobsters adopted in the neighboring states of New York, Rhode Island, Connecticut and New Jersey.

From many sections of the State complaints have been received from the lobstermen of the loss of gear because buoys were cut off by the propellers of boats. Lobstermen in the vicinity of Vineyard Haven and New Bedford seem to have suffered most from this trouble, although in the districts near Boston and Scituate many lobster pots were also lost from this cause. Some lobstermen in the vicinity of New Bedford reported the loss of from 100 to over 200 lobster pots during the season. The complaints of the fishermen were especially directed toward the United States destroyers and Coast Guard boats. Last year in the vicinity of Menemsha Bight the Navy Department established lanes and areas within which the destroyers were to confine their operations and lobstermen were to keep outside. During September and October the matter was again brought into such prominence that the Secretary of the Navy sent a communication on the subject to Congressman Charles R. Gifford, in which the Secretary alleged that the fishermen were more at fault than the officers in charge of the destroyers. The fishermen vigorously denied this. After considerable agitation the affair quieted down. We believe that as a result of the prominence given to the subject a better understanding and spirit of cooperation has resulted between the Navy Department and the lobstermen.

Under the law authorizing the purchase of egg-bearing lobsters, it is reported that a total of 11,769 were bought at an expenditure of \$10,016.22. These lobsters were punched in conformity with the law and liberated as nearly as possible to the localities in which they were taken. In addition to these more than 8,000 egg lobsters were put overboard by the fishermen without compensation from the State.

From shipments from Canadian Provinces and other points without the State a total of 16,499 undersized live lobsters and 16 egg-bearing lobsters were liberated in suitable waters from Rockport to Chatham.

As required by chapter 130, General Laws, it is hereby reported that during the fiscal year of 1930 there were 1,051 lobster licenses issued.

Up to the date of issuing this report 875 lobstermen had sent in reports on the year's catch as required by law. The following tabulation of these reports has been made and covers the period from October 20, 1929, to October 20, 1930. This does not constitute a complete report of the catch, as the reports from nearly 200 lobstermen are still lacking.



	TOTAL CATCH	CATCH BY COUNTIES								
		Essex	Suffolk	Norfolk	Plymouth	Barnstable	Bristol	Nantucket	Dukes	Unlisted
Number of men . . . . .	1,051	314	88	55	225	136	98	19	116	-
Lobster Catch:										
Number . . . . .	1,712,531	398,209	19,812	111,051	406,578	222,177	237,100	24,882	309,101	2,276
Pounds . . . . .	2,568,796	597,313	29,718	166,576	609,867	333,165	355,650	37,323	463,651	3,414
Value . . . . .	\$770,638.80	\$179,193	\$8,915	\$49,972	\$182,960	\$99,949	\$106,695	\$11,196	\$139,095	\$1,015
Number of Egg Lobsters . . . . .	19,591	4,569	593	1,582	30,070	3,829	2,190	467	3,592	6
Lobster Pots:										
Number . . . . .	62,131	13,116	3,359	4,303	10,464	9,324	12,618	1,199	8,218	90
Value . . . . .	\$248,524.00	\$52,456	\$13,436	\$17,212	\$41,856	\$37,296	\$50,472	\$4,796	\$32,872	\$360
Boats:										
Number . . . . .	1,133	204	58	74	242	161	159	30	108	6
Value of Boats and Accessories . . . . .	\$422,149.36	\$107,088	\$13,788	\$43,570	\$65,057	\$61,800	\$49,774	\$1,024	\$70,487	\$282
Total Equipment Value . . . . .	\$671,573.36	\$159,544	\$27,224	\$60,782	\$108,863	\$99,096	\$100,246	\$15,820	\$103,359	\$642
Average Pounds per Lobster Pot . . . . .	41.31	45.5	8.8	38.7	58.5	35.8	28.5	31.1	56.4	37.9

<sup>1</sup> The average number of pounds per lobster pot along the entire New England Coast, according to the latest available figures, was 37.8 pounds.

## MOLLUSK FISHERIES

In conformity with our usual custom, data and statistics on the mollusk fisheries were collected by the coastal wardens in the towns in their respective districts. In addition to the usual report blanks, other questionnaires were sent out near the end of the year in order to lay the ground work for bio-statistical records which will enable us in the future to work more intelligently on a proposed program intended to assist in reviving our depleted shellfish areas. There are thousands of acres in the unpolluted shellfish areas which are capable of growing shellfish in abundance but which are now either barren or very nearly depleted. In some of these areas the problem is simple but in others it is quite complex.

*Clam*

The chief problem confronting the clam industry is, without doubt, pollution. Thousands of acres of productive clam flats have been closed to the public because pollution has made the consumption of these shellfish a menace to public health. Without doubt the most desired solution of this problem would be the adoption of modern sanitary methods of sewage disposal and its entire elimination from our streams and tidal water. In some localities this could be done without prohibitory cost, but in the meantime something should be done to recover the immense amount of shellfish now contained in these polluted areas.

In Essex County alone there is a total of more than 3,000 acres of productive clam flats capable of yielding considerable in excess of 1,000,000 bushels of clams. Three-fourths of this area is now under ban as contaminated, and while some portions are under-stocked, the digging of clams in certain sections under permit from the Supervisor for treatment at chlorination plants allows us to safely estimate that in Essex County there are more than 500,000 bushels of clams within the contaminated areas. These clams would be valued at approximately \$1,500,000. In other sections of the State shellfish areas are closed which are similarly valuable.

These statements should not be considered as rash or ill advised. In 1930, from August until November 30, according to the reports from wardens supervising the digging, a total of 39,178 bushels of clams were taken from contaminated areas to the purification plants. The value of these clams was \$107,740, and the digging of them furnished employment for quite a number of men.

Two plants participated in the reclamation of clams from these areas. One, located at Plymouth and known as the Pioneer Fisheries Company, was approved by the Department of Public Health in March, and later, in September, a second one which was situated at Newburyport was similarly approved. This latter one is known as the Newburyport Purification Plant. The operation of these two plants has been quite satisfactory.

Additional work in the polluted areas of the State was done in that portion of Clark's Cove which is situated in New Bedford. From this cove, under permit from the Supervisor, a total of 6,629 bushels of quahaugs and little necks were transferred into clean areas at Fairhaven by Manuel F. Silva, the proprietor of the Silver Shellfish Company. A more complete account of the shellfish activities of this department will be given in a special report that will be published in the near future.

As will readily be seen from the above brief summary of the operations in connection with salvaging clams from the contaminated areas, what has been done up to this time is scarcely more than a demonstration. A great deal more could be and should be accomplished along this line. The experience obtained has served to convince us that the whole subject of chlorination should be more carefully studied, particularly from the marketing standpoint, and we earnestly recommend that a commission be appointed with sufficient appropriation to make a thorough biological examination of the entire subject. This should be done at once in order to conserve this most valuable resource of the Commonwealth.

From information obtained from all available sources it appears that there were approximately 751,079 bushels of clams taken from Massachusetts shores in 1930, valued at \$2,243,648. This value should not be taken as absolutely cor-

rect, but is a fair estimate of the product, taking all items into consideration and including amounts taken for family use. From neighboring states, chiefly Maine, a total of 250,000 bushels of clams were reported to have been shipped into the state.

### *Scallop*

The shore scallop fishery was generally in a very prosperous condition in the season of 1930. Not only was the total catch a little larger than usual but prices were good, averaging around \$3.50 per gallon. More boats were engaged in scalloping than last year and to a certain degree this fact was somewhat responsible for the larger catch. Weather conditions were generally favorable. As noted elsewhere, in Nantucket alone more than \$100,000 worth of scallops were caught. Scallops are taken commercially in some 15 towns in the State, and from those towns, according to reports, a total of 190,593 gallons were taken in 1930. These were valued at \$667,075. Furthermore, this past summer a good set occurred in almost all areas and unless adverse weather conditions occur there is every reason to expect a good season in 1931.

### *Razor Clam*

A shellfish industry upon which little comment has been made in the past is the razor clam industry, or razor fish, as it is often locally known. The principal towns in which this shellfish is found in commercial quantities are Barnstable, Wellfleet, Dennis, Brewster and Eastham. In addition to these localities there is a fairly good bed of razor clams in the contaminated area off Revere, and a few more in Duxbury and Plymouth. Unfortunately practically all razor clams are sold at a low price for bait purposes, although they are excellent food, comparable, when not too old, to scallops. An effort is being made by the Supervisor, with considerable success, to cooperate with the town authorities in finding a market for this shellfish. If marketed as food the value would be increased from two to three times the amount that would be received if sold for bait.

A good set of razor clams occurred in 1928 and 1929 in Barnstable and a very abundant set this past year, so that there is every prospect for a continuance of good digging for a few years to come.

The statistics on the razor clam industry show that the value of the output in 1930 was \$25,956, of which amount \$12,956 was the value of the output at Barnstable. From 45 to 75 men are at work harvesting this product on the flats in Barnstable. We have recommended that the selectmen of that town put a minimum size limit of 4½ inches on razor clams as a conservation measure.

### *Quahaug*

Only a fair season was indicated for the quahaug industry throughout the State from the reports of coastal wardens and those engaged in the business commercially. Of principal concern, however, was the report that practically no set was obtained over wide areas. More intensive cultivation is needed in many sections of the State with particular emphasis on leaving sufficient number of vigorous spawners — those somewhat larger than the size known as little necks. The spawn from quahaugs of this size is particularly virile.

### *Oyster*

Those engaged in the oyster industry report a very favorable season. There was a good demand for shell stock and a considerable quantity of seed oysters was sold. Among the activities of the towns there is an item of 4,500 bushels of oyster seed planted by the town of Barnstable. According to the most accurate figures obtainable the value of the output from the oyster industry in 1930 was \$170,000.



### *Permits for Seed Shellfish*

Under permits from the Supervisor the following shellfish seed were taken and planted in suitable areas in 1930:— soft shell clam seed,  $26\frac{1}{2}$  bushels; seed quahaugs, 1,452 bushels; seed oysters, 4,500 bushels. In addition to these items, 300 bushels of seed scallops were taken into deeper water by permit by the Town of Barnstable from the shores of Squaws Island and Dunbar Point, where they had been washed ashore by heavy storms.

### *Sea Scallop*

There was a slight increase in the amount of sea scallops taken off Massachusetts this past year. This was partly brought about by the low prices and meager catches of other fish, which caused some enterprising fishermen to turn to sea scallops as a more remunerative field. The principal areas from which they were obtained were southeast of Nantucket Shoals and off Provincetown. Until quite recently the greater part of the boats engaged in this fishery were from Maine, but lately more local boats are becoming equipped for this work. Locally the market for sea scallops was glutted twice, and in New York nearly five times. Approximately 125,000 gallons were taken, valued at \$250,000.

### ALEWIFE

The coastal wardens collected statistics on the alewife fisheries in the districts in which this fishery occurs. In most streams the catch was small and there was a falling off in the total revenue obtained by towns from leases. The best run reported was in the Motiket stream in Nantucket, where hundreds of barrels of alewives were taken. In common with other fish the price on alewives was very low.

### FISHWAYS

#### *The Parker River Fishways*

Agitation in recent years on the subject of providing suitable fishways in the Parker River system began in 1922, when local organizations called the attention of the Division of Fisheries and Game to the impossibility of anadromous fish going over the obstructing dams to suitable spawning grounds. A preliminary survey of the project was accordingly made in October of that year.

Prior to this time the matter had been the subject of legislation as early as 1793. In 1806 mill owners were required by law to provide fishways over obstructing dams, but such as were built at that time have long since fallen into disrepair. In the summer of 1927 the subject was again revived. With the idea in mind of building something satisfactory and permanent in nature, the Division of Fisheries and Game in 1928 assigned Dr. David L. Belding, a biologist long associated with the Division, and Mr. George M. Besse of East Wareham, a man well experienced in the alewife fisheries, to study the situation. Their report showed that the project was both practical and feasible.

After several hearings were held a special bill was filed with the Legislature in 1930, asking for an appropriation out of the general tax levy sufficient to cover the cost of construction. Accordingly, an appropriation of \$7,500 was voted by the General Court and approved by the Governor in March. The fund was to be expended by the Director.

Plans were drawn up in accord with Mr. Besse's idea of a practical fishway, releases were obtained from the owners of adjoining land and those holding water rights, and, on September 26, the contract was let to the George M. Nicoll Company of Boston.

Work was begun on the fishways on October 26 and although, as the actual building progressed, certain minor changes in the detail of construction were found to be advisable, the work was completed on November 14.

The sides of the fishways were built of cement and stone, "dry-laid." They provide a passage-way for the fish over five principal obstructions into Cranes

Pond and eventually into Pentucket Pond, a total distance of about twelve miles from the first obstruction. A maximum depth of 18 inches and a width of 4 feet is maintained throughout.

The fishways are of permanent construction, and, as designed, allow adequate passage-way for the migration of any species of anadromous fish such as alewives, white perch, smelt and shad. There is every reason to believe that these structures will greatly assist in restoring these fisheries in this locality.

The total amount expended in the construction of these fishways was \$7,462.62, of which amount \$4,745 was included in the original contract and an amount of \$2,717.62 for additional work deemed advisable in order to further strengthen the construction.

#### *Other Fishways*

Other fishways which are maintained throughout the State have been inspected regularly by the Coastal Wardens in their various districts and have been reported as in working condition. In compliance with chapter 174 of the Acts of 1918 it is hereby reported that no expenditures were made in the maintenance of the fishways at Lawrence and Lowell. The only money expended for repairs or construction of fishways, excepting at the Parker River as noted above, was an amount of \$52.23 for slight repairs on the fishway at the Sippican River in Marion and Rochester.

#### SEA CRAB INDUSTRY

Starting some thirty years ago with the sale of crabs from a few push carts around the wharves at Boston, the sea crab industry of Massachusetts has grown to a position of considerable importance among the fishing activities of the Commonwealth.

At first the crabs were caught only in circular nets which were baited, suspended in the water and pulled up at intervals. About the year 1905 some one believing that there was a promising future in the crab fishery began to experiment with various styles of crab pots. The large number of crabs caught in these traps made it necessary for the little industry to develop a market for them. It was soon discovered that crabs could be marketed much more readily in the form of crab meat than in the shell. So at first a selected list of hotels and restaurants was canvassed, and then, as the demand increased, it was necessary to market the product through the regular trade channels.

From this small beginning the sea crab industry has grown to such proportions as to make necessary the use of more than 8,000,000 crabs in 1930. This number converted into crab meat yielded approximately 212,500 lbs. with a market value of \$148,750. Practically all of this business is conducted in Boston but there are also small crab fisheries in Beverly, Gloucester and Lynn.

The industry regularly employs some twenty-six fishermen in Boston and there is also about an equal number of fishermen throughout the State employed intermittently in fishing for crabs.

Comparing the catch of 1930 with such figures and estimates as are at present available for previous years it would appear that the supply of crabs in the waters of our Commonwealth was diminishing quite rapidly. Two or three years ago, where there had been a daily catch of some 25,000 crabs, in the past year, during the same period with a similar amount of gear, not more than 15,000 were caught.

Conditions of this sort demand some sort of a remedy if the industry is to survive. Some of the dealers have suggested a closed season extending through the winter months from December to April. It is pointed out that during this period most of the crabs taken are either "soft shell" or "hollow" and it requires some 80 of them to make a pound of "flakes," as the meat of the claws is called, and in addition to this there is practically no "body meat." In the remaining part of the year, when the crabs are hard, only 25 would be required to make a pound of "flakes," and these crabs would also yield about  $\frac{1}{4}$  pound of body meat. The



"soft shell" or "hollow" condition is brought about by moulting (shedding the shell) which all crustacea must do in order to grow. These same crabs, therefore, which during the winter months are light in weight, would more than double their weight during the few months when they would be protected by the closed season, and consequently a considerable saving or conservation would be effected by protecting them during this period.

Without entering into the details of the proposal, some points of which would require further investigation, it would seem as though the proposal for a closed season might be very beneficial to the industry, and despite the great demand and the intensive fishing which will be necessary in order to supply this demand, the industry might be maintained in a fairly prosperous condition for many years, if proper protective laws should be enacted.

As required by chapter 130, General Laws, it is hereby reported that there were 57 crab licenses issued during the fiscal year of 1930.

### BAIT WORM INDUSTRY

Near Oak Island and on the shores in the vicinity of Winthrop may be seen, at almost any tide, from April to November, some ten to thirty men with pails and clam hoes digging in the flats for certain species of annelid worms much sought after in certain sections of the country as bait. These worms are for the most part shipped to New York in baskets carefully packed in some form of alga, which is dampened and so arranged as to keep the live worms cool and give them good circulation of air.

Two species of worms are saved by the diggers. The one almost exclusively used in the trade is the blood worm (*Glycera dibranchiata*), so called because of the bright red color of the blood which appears rather profusely when the worm is injured. The other one, variously known as the sea worm, clam worm or flat fish worm (*Neries virens*) is not used to any great extent in Massachusetts, although quite popular elsewhere as bait when "bobbing" for eels.

The blood worms swim about freely from place to place and are able to burrow quite rapidly by reason of their ability to coil themselves into a spiral and by rapidly rotating themselves on the axis of the spiral almost instantly disappear into the sand with a motion not unlike that of a corkscrew. The proboscis is remarkably long, very extensible and has tremendous suction power. When it is fully extended four very sharp, black, fang-like teeth appear at the end.

These worms are usually found at about middle tide and at times are quite abundant, although seldom are more than four or five found in a square foot. They migrate freely suddenly appearing on a certain shore or abandoning it with equal rapidity according as they find conditions are favorable or not.

In the season of 1930 as many as thirty men have been employed at one time on the shores about Boston. From data collected it is calculated that more than 2,500,000 blood worms were shipped away by this group of men during the past year, and a revenue of more than \$39,375 was obtained.

From many angles of reasoning it seems that the digging and sale of these worms should be encouraged. The shallow digging necessary to obtain them is often beneficial to a shore long unproductive. Then, too, blood worms have been accused of destroying the soft shell clam, and, indeed, have been found in the empty shells of dead clams. The preponderance of evidence, however, seems to indicate that, while they may and perhaps do attack clams, inasmuch as they move about freely on the shores and yet do not congregate where clams are abundant, but, on the contrary, appear to avoid such areas, there seems to be very little evidence to support the theory that blood worms are a serious menace to our clam flats. Taking them from the shores would, however, tend to remove any chance of harm.

It will be interesting to observe what effect the taking of so many of this species will have on the future supply of them.



### OUTPUT FROM HATCHERIES OF U. S. BUREAU OF FISHERIES

Through the courtesy of the Superintendents of the Marine Fish Hatcheries of the U. S. Bureau of Fisheries at Woods Hole and Gloucester, we are pleased to report the following numbers of marine fish fry and fish eggs released by the Bureau in Massachusetts waters during the calendar year of 1930.

The item listed as "green eggs" represents eggs which were stripped from fish taken by the commercial fishery and would otherwise have been a total loss as the fish were en route to the markets. These eggs were carefully fertilized and put overboard on the fishing grounds.

#### RELEASED IN MASSACHUSETTS WATERS 1930

SPECIES	Fry	Eyed Eggs	Green Eggs	Station
Cod . . . . .	59,156,000	70,087,000	—	Woods Hole
Cod . . . . .	229,769,000	—	393,101,000	Gloucester
Haddock . . . . .	63,168,000	—	95,424,000	Gloucester
Mackerel . . . . .	16,692,000	—	—	Woods Hole
Pollock . . . . .	549,126,000	—	—	Gloucester
Winter Flounder . . . . .	159,972,000	—	—	Gloucester
Winter Flounder . . . . .	735,387,000	6,962,000	—	Woods Hole
Totals . . . . .	1,813,270,000	77,049,000	488,525,000	—

### COLD STORAGE WAREHOUSES

The cold storage warehouse is an essential link in the chain of processes necessary for satisfactorily marketing the tremendous amount of fishery products of our Commonwealth. Without the freezer a great part of the supply would be lost to the consumer, except the amount that might be canned or salted.

Older methods of handling the fish in the cold storage plants are rapidly being displaced by more satisfactory processes. The modern method of quick freezing at a temperature of around 40 degrees below zero, if done at a proper time when the product is absolutely fresh, results in a product unexcelled by the fresh variety in point of flavor, tenderness and nutritive value.

Indeed, looked at from certain angles the product may be considered superior. From the moment fish are caught the processes of spoiling begin, and even when given the utmost care by packing in cracked ice the deterioration is merely delayed. The length of time that the fish has been en route to the consumer and the degree of care with which it has been handled can seldom be correctly ascertained. On the other hand, when the product is quickly frozen immediately upon arrival at the freezer the danger of becoming impure is negligible until such time as thawing has begun, and this can be greatly delayed by quite simple methods. The quick freezing method is rapidly gaining in favor, and it seems safe to predict that in the very near future practically all food fish, not salted, will be subjected to this process.

From the monthly reports of the Department of Public Health we obtain the following figures:—

In 1930 there were 27 cold storage warehouses in Massachusetts holding fish under licenses from the department. The species frozen in the largest numbers were the ground fish (cod, hake, pollock and haddock), mackerel, herring, whiting and squid. During the period between November 15, 1929, and November 15, 1930, there were 52,954,729 lbs. placed in these freezers. The number of pounds put in the freezers each month varied from 1,396,124 for the month ending April 15, to 10,836,807 pounds for the month ending August 15. As might be expected, during the period from May to September there was a total of approximately 50% more than in all the remaining months of the year. On August 15, 26,689,970 pounds were on hand in the freezers while on April 15 only 3,430,654 pounds were in storage.

## BOUNTY ON SEALS

The following towns were reimbursed by the Commonwealth for bounties paid on seals in accord with chapter 130, General Laws, section 155: Gloucester, \$2; Cohasset, \$8; Duxbury, \$38; Essex, \$12; Hingham, \$8; Ipswich, \$134; Kingston \$82; Plymouth, \$4; Quincy, \$8; Revere, \$2; Rowley, \$8; Winthrop, \$2; Yarmouth, \$220; fees to treasurers, \$132. Total, \$660.

## NOTE OF APPRECIATION

We desire to express our appreciation for assistance in the preparation of the report on the Marine Fisheries, which was freely rendered by the U. S. Bureau of Fisheries and many persons engaged in the fisheries trade, especially local fishermen and dealers. We desire to make particular mention of the cooperation of the Massachusetts Fisheries Association, the Nantucket Fishermen's Association, the reorganized Massachusetts Shellfish Association, and the North Shore Shellfish Association. This expression of gratitude would not be complete without acknowledging our indebtedness to Arthur L. Millett, State Fish Inspector, who has had many years of experience in the preparation of material for the Marine Fisheries section of our annual report.

Respectfully submitted,

WILLIAM C. ADAMS, *Director*.

## APPENDIX

Due to the fact that a complete revision of the inland fish and game laws was enacted by the Legislature of 1930, the Division made no recommendations at the close of the year 1930 for consideration of the Legislature of 1931.



The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

*Mass. Dept. of Conservation*  
Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1931

DEPARTMENT OF CONSERVATION

[OFFICES: 20 SOMERSET STREET, BOSTON.]



MAY 27 1982

STATE HOUSE, BOSTON

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## DEPARTMENT OF CONSERVATION

*Commissioner*, WILLIAM A. L. BAZELEY, Uxbridge

### DIVISION OF FISHERIES AND GAME

20 Somerset Street, Boston, Mass.

Director, RAYMOND J. KENNEY, Belmont

Chief Fish and Game Warden, CARL G. BATES, Worcester

Fish and Game Warden Supervisor, FORREST S. CLARK, Braintree

Biologist and Supervisor of Distributions, J. ARTHUR KITSON, Boston

Supervisor of Fish and Game Permits and Claims, ORRIN C. BOURNE,  
Melrose

Inspector of Fish, ARTHUR L. MILLETT, Gloucester

Supervisor of Marine Fisheries, ZENAS A. HOWES, Quincy

Biologist and Statistician — Marine Fisheries, EARNEST W. BARNES,  
Roslindale

Head Clerk, MISS L. B. RIMBACH, Medford



# The Commonwealth of Massachusetts

## ANNUAL REPORT

The Director of Fisheries and Game herewith presents the sixty-sixth annual report.

### GENERAL CONSIDERATIONS

In looking back over the twelve months covered by this report the outstanding development in fish and game administration appears to be the marked increase in the public interest concerning fishing and hunting and wild life conservation and the desire to participate in its management, the results of which will undoubtedly become more apparent during the approaching year.

This public interest has become manifested in two ways, the first of which is the activity on the part of the land owners throughout the Commonwealth for a closer control of hunting and fishing activities on their lands. The amount of posted land was rapidly increased, and in several sections of the State the land owners have organized voluntary associations or corporations for a better control of hunting and fishing on their respective lands.

For more than three centuries the citizens of Massachusetts have enjoyed hunting and fishing, the greater part of which has been carried on through the courtesy of the land owners, and the work of the State has been confined exclusively to a regulation of hunting and fishing and the restocking of private lands for public hunting and fishing. The swiftly moving change which has come about in the past few years, particularly during the present one, has not been confined exclusively to Massachusetts but is apparent in other states where the character of the land and its uses is similar to Massachusetts. Nevertheless, it has become increasingly difficult for the sportmen of Massachusetts to comprehend this readjustment.

The Constitution of Massachusetts in Part I, which embodies the Declaration of Rights, provides, "Article I. All men are born free and equal, and have certain natural, essential, and unalienable rights, among which may be reckoned the right of enjoying and defending their lives and liberties; that of acquiring, possessing, and protecting property; in fine, that of seeking and obtaining their safety and happiness."

The earliest Colonial laws provided that hunting and fishing should be free to all the inhabitants of the Commonwealth, and accordingly all wild birds, mammals and fish have remained the property of the Commonwealth. The public ownership of game has been definitely pointed out by our Supreme Court in the case of *Dapson v. Daly*, 257 Mass. 195. In its decision the Court said, "In this Commonwealth the title to wild animals and game is in the Commonwealth in trust for the public, to be devoted to the common welfare."

The subsequent adoption of the State Constitution, however, guaranteed certain property rights to land owners which more and more have come into conflict with the right of the public to enjoy free hunting and fishing. But the supremacy of the Constitution has placed the land owner in control of hunting and fishing, although not giving him the ownership of the fish and game upon his premises.

The exercise of constitutional rights by land owners has been brought about very largely by the desire to protect their property against misuse by a relatively small number of unthinking sportsmen, and to a lesser extent for the purpose of providing more opportunity for the land owner and his guests to enjoy field sports. To date little or no attempt has been made to commercialize hunting and fishing through the medium

of selling, not the fish or game which is the property of the Commonwealth, but the right to trespass on private land for the purpose of acquiring the public property found thereon in the nature of wild life.

The answer to the apparent conflict between the land owners and the sportsmen appears to be twofold,—some cooperative plan between the land owners and the sportsmen, and the establishment of public hunting and fishing grounds. No definite cooperative plan has thus far been brought forward, but developments are being carefully watched in other states throughout the nation, and the coming year may see a plan evolved which will meet the situation.

For the first time in the history of the Commonwealth definite steps have been taken for the establishment of public hunting and fishing grounds, as this year's Legislature made an initial appropriation for that work. Attention was first directed toward the establishment of public fishing grounds along one of the Commonwealth's finest trout streams. Upon the success of this and similar undertakings depends largely the continuance of public hunting and fishing in Massachusetts; but it is fortunate that a system of public fishing grounds can be founded on the natural great ponds of the State, numbering nearly one thousand, wherein the public rights for fishing have been forever guaranteed.

The second way in which public interest has been manifested is by the fact that, apart from the attitude of the land owners, a great number of the citizens of the Commonwealth have shown a lively interest in wild life protection and willingness to contribute to the cost of its maintenance.

The financial policy of the Commonwealth now in effect places the financial burden for the protection of the wild life on the shoulders of those who purchase sporting and trapping licenses, although it is obvious that the Commonwealth should protect, in the interest of all its citizens, its wild life resources, particularly those species which do not afford food or sport. The public is beginning to show its desire to contribute, through general taxation, a share of the cost of the Division's appropriations for the protection of wild life, and the time appears to be approaching when the fees obtained from the sale of sporting and trapping licenses may be devoted entirely to the use of the sportsmen in the establishment of public hunting and fishing grounds and the production of fish and game for liberation thereon.

The Division has done its utmost to bring together the sportsmen, land owners and conservationists by means of various conferences, and the establishment of an unofficial advisory council, hereinafter referred to, with a view to establishing a definite policy for wild life conservation in the interests of all concerned. A very hopeful and tangible spirit of cooperation has been in evidence during these deliberations.

#### HEADQUARTERS OF THE DIVISION

Owing to crowded conditions in the State House the Governor and Council assigned quarters at 20 Somerset Street to the Department of Conservation as of March 1. As the building is owned by the Metropolitan District Commission rather than by the State, the Fish and Game Division pays for its quarters an annual rental of \$6,095.

#### PERSONNEL

In June Director William C. Adams tendered his resignation, to take effect July 1, in order to take up similar work in the State of New York. Mr. Adams had served the Commonwealth for eighteen years—first as associate commissioner on the Board of Commissioners on Fisheries and Game from August, 1913 to February 29, 1916, at which time he was elected chairman of the Board. He continued in that capacity until 1919. At that time the consolidation of all the State commissions brought the Department of Conservation into being, and Mr. Adams was appointed



Director of the Division of Fisheries and Game in that department, in which he served until the time of his resignation.

At a meeting of the Department of Conservation held June 29, the following resolutions were adopted and spread on the records of the department:

*"Whereas, We learn with mingled feelings of pleasure and sadness that William C. Adams, who has been a conspicuous figure in the conservation work of this Commonwealth, has severed his connection with this department and will soon assume the duties and responsibilities of a highly important position in the State of New York, be it*

*"Resolved, That by his departure from Massachusetts this department has suffered a severe loss and one of its most earnest workers. He is one who has always exhibited the highest motives in his devotion to the public welfare. Honest and courageous in his affairs, reliable in his judgment, his effective work for wild life conservation and its worth to the Commonwealth can never be overestimated, and we sincerely regret that we are not allowed to longer enjoy the benefit and influence of his association in the department.*

*"Resolved, That the Department of Conservation wishes for Mr. Adams the fullest measure of prosperity and happiness throughout all the years to come, and this department directs that these resolutions be entered upon the records of the department."*

The vacancy left by the resignation of Mr. Adams was filled by the appointment, on June 24, of Raymond J. Kenney of Lowell, which was confirmed on July 1. Mr. Kenney has served in the Division for thirteen years, coming up through the positions of Deputy Chief Warden and Chief Warden,—which position he held at the time of his appointment as Director.

The position of Chief Warden thus left vacant was filled by the promotion of Fish and Game Warden Supervisor Carl G. Bates of Worcester, who on July 1 became acting Chief Warden and on August 1 Chief Warden.

His place as Field Supervisor was filled on August 22 by Warden Forrest S. Clark of Braintree, located at Holden.

A new position was created,—that of Field Agent. The Field Agent has charge of the acquisition of areas for public hunting and fishing grounds, for the establishment of which an appropriation was made for the first time this year. To this position was appointed, provisionally, William L. Osterhout of Orange.

On the resignation on August 31 of Miss Gertrude T. McManus, License Clerk, Miss B. L. Butterworth, of the office staff, was appointed to this position.

#### FINANCES

The financial condition of the Commonwealth and general economic conditions compelled His Excellency the Governor to request the department heads to prepare their forecasts for the 1932 budget on the basis of a reduction of at least five per cent under the actual appropriations for the present fiscal year. Accordingly the Division's forecast was sent to the Budget Commissioner with a decrease of five per cent in each major group of its activities. This required the elimination of many worthwhile projects of value and importance in conservation work. Strict economy and a curtailment of some activities must be practiced in operating the Division during the coming fiscal year if the Legislature does not increase the amounts contained in the forecast, due to the fact that certain fixed charges increase from year to year. The proposed reduction of operating expenses included, among other things, the omission of all requests for salary increases for the personnel of the Division during the coming year. Despite the fact that the sale of sporting and trapping licenses decreased by 15,442 during the fiscal year, the revenue from them



increased by \$26,733 because of the increase in the cost of sporting and trapping licenses which became effective on January 1 of this year.

There is an increasing public demand, particularly from citizens who do not hunt or fish but who are intensely interested in wild life, that some or all the expense of maintaining the warden force be financed out of general taxation. Many of these conservationists believe that the protection of wild life is one of the police functions of the State, having in mind that the warden force spends a considerable part of its time in the protection of song and insectivorous and non-game birds. This public sentiment has not as yet been accepted in administrative circles and the Forecast for 1932 was prepared on the assumption that the entire cost of law enforcement would be charged against the fees received from sporting and trapping licenses and other revenue derived from the sportsmen's activities.

At the request of the Commission on Administration and Finance a survey is being conducted to determine ways and means of increasing the revenue of the Division by means of establishing a charge to individuals who receive special services from the Division. While this survey has not been completed it has become apparent that only a nominal amount of revenue could be realized from the extension of the present policy of charging a fee for the issuance of special permits.

## APPROPRIATIONS AND EXPENDITURES

	Appropriations	Balances, refunds, transfers	Expenditures	Balances to 1932	Balances to State Treasury
<b>Part I (Revenue for 1930, \$284,-635.70)</b>					
Salary of the Director	\$5,000.00	—	\$4,779.53	—	\$220.47
Office Assistants, Personal Services	11,900.00	—	11,897.36	—	2.64
Office Expenses	13,500.00	\$115.23	13,069.42	—	545.81
Education and Publicity	1,000.00	—	997.08	—	2.92
Enforcement of Laws:					
Personal Services	71,060.00	—	70,744.22	—	315.78
Expenses	44,000.00	176.08	34,164.05	—	10,012.03
Biologist:					
Personal Services	8,320.00	—	8,309.66	—	10.34
Expenses	3,420.00	1.26	2,390.27	\$1,030.99	—
Propagation of Game Birds, etc.	122,000.00	228.64	121,471.37	—	757.27
Improvements and Additions at Game Farms and Fish Hatcheries (\$8,700 for relief of unemployment and \$24,400 regular appropriation)	33,100.00	967.84	28,550.66	5,517.18	—
Damage by Wild Deer and Wild Moose	6,000.00	—	6,469.82	—	469.82 <sup>1</sup>
Establishment of Public Fishing and Hunting Grounds	25,000.00	—	1,432.62	23,567.38	—
<b>Part II (Revenue for 1930, Nothing)</b>					
Protection of Wild Life	4,500.00	—	4,492.67	—	7.33
<b>Part III (Revenue for 1930, \$8,649.30)</b>					
Marine Fisheries:					
Sale and Cold Storage of Fresh Food Fish	18,000.00	3.75	17,097.89	—	905.86
State Supervisor of Marine Fisheries:					
Personal Services	9,000.00	—	8,519.00	—	481.00
Expenses	6,000.00	1,036.23	5,927.64	—	1,108.59
Enforcement of Shellfish Laws:					
Personal Services	15,900.00	—	15,900.00	—	—
Expenses	13,300.00	—	12,789.25	—	510.75
Deficiency appropriation, Purchase of Lobsters	420.25	—	420.25	—	—
Purchase of Lobsters	10,000.00	—	8,883.00	—	1,117.00
Improvements on Certain Fishways	200.00	—	60.00	140.00	—
Construction of Parker River Fishways	—	781.13	755.75	—	25.38
Bounty on Seals	800.00	—	675.00	—	125.00
	\$422,420.25	\$3,310.16	\$379,796.51	\$30,255.55	\$15,678.35

<sup>1</sup> Deficit.

## REVENUE

Following is the revenue accruing to the State Treasury for the period of the fiscal year, from the activities of this Division.

	Part I Produced by the hunters, anglers and trappers.	Part II Produced by those who enjoy wild life but do not hunt, fish or trap.	Part III Produced by the marine fisheries.
<b>Part I</b>			
Sporting and trapping license fees (\$296,456.10 less \$98.50 refunded on account of overpayments in 1930)	\$296,357.60		
Rent, sales, etc., at stations . . . . .	300.00		
Sale of shiner permits . . . . .	475.00		
Sale of game tags . . . . .	211.20		
Sale of confiscated goods . . . . .	85.14		
Sale of miscellaneous goods . . . . .	4.00		
Sale of gunning stand permits . . . . .	825.00		
Fines turned into State Treasury as a result of inland fish and game law violations . . . . .	10,376.00		
<b>Part II</b>			
Sale of boat engine . . . . .		\$45.00	
<b>Part III</b>			
Lobster license fees . . . . .			\$5,398.05
Crab meat license fees . . . . .			261.90
Sale of lobster meat permits . . . . .			400.00
Sale of lobster rules . . . . .			5.00
Lease of clam flats . . . . .			65.00
Fines turned into State Treasury as a result of marine fisheries violations . . . . .			2,943.75
Total Revenue, \$317,752.64 . . . . .	\$308,633.94	\$45.00	\$9,073.70

## DETAIL OF RECEIPTS FROM SPORTING, TRAPPING AND LOBSTER LICENSES\*

	Total number issued	Gross value	Fees to clerks	Net Return to State
Resident Sporting (\$2.75) . . . . .	111,192	\$301,182.00	\$27,704.00	\$273,478.00
Resident Trapping (\$5.25) . . . . .	1,186	3,292.50	296.00	2,996.50
Non-resident Sporting (\$10.25 and upwards) . . . . .	1,164	8,487.00	290.50	8,196.50
Non-resident Trapping (\$10.25) . . . . .	12	73.00	3.00	70.00
Non-resident Sporting (\$3.25 and upwards) . . . . .	1,413	5,745.60	351.50	5,394.10
Non-resident Trapping (\$5.25) . . . . .	5	14.25	1.25	13.00
Alien Sporting (\$15.25) . . . . .	278	4,239.50	69.50	4,170.00
Alien Trapping (\$15.25) . . . . .	3	45.75	.75	45.00
Minor Fishing (\$1.25) . . . . .	508	635.00	127.00	508.00
Minor Trapping (\$1.25) . . . . .	1,466	1,206.00	366.50	839.50
Duplicate Licenses (\$0.50) . . . . .	1,491	745.50	—	745.50
Totals, sporting and trapping licenses . . . . .	118,718	\$325,666.10†	\$29,210.00	\$296,456.10
Deduct fees to clerks on account of 1930 licenses . . . . .				98.50
				\$296,357.60†
Lobster (\$5.00) . . . . .	1,113	\$5,565.00	\$166.95	\$5,398.05
Crab (\$5.00) . . . . .	54	270.00	8.10	261.90
Totals, marine licenses . . . . .	1,167	\$5,835.00	\$175.05	\$5,659.95

\* This table covers the fiscal year from December 1, 1930, to November 30, 1931. The license fees in December, 1930, were different from those established January 1, 1931.

† Does not include licenses issued free of charge to persons having reached the age of seventy.

## CONVENTIONS AND MEETINGS

Director William C. Adams was prevented by illness from attending the meeting in New York City on December 1 and 2, 1930, of the National Game Conference, held under the auspices of the American Game Protective Association. His paper, "The Development of Massachusetts Game Breeding Work," which included feeding formulas as well as breeding methods for both quail and pheasants, was read. He was elected chair-

man of the meeting to be held in December, 1931. Raymond J. Kenney, at that time Chief Warden, was present at the conference.

Director Adams was likewise unable to attend the meeting of the Advisory Board to the Secretary of Agriculture relative to the regulations proposed by the Bureau of Biological Survey affecting wild fowl, held in Washington, D. C. on Dec. 4, 1930.

No general sportsmen's conference was called as has been the custom in past years, due to the fact that the organization of the county leagues and the State Council have been perfected, thus bringing into being truly representative government as far as the sportsmen are concerned.

Following his usual practice Director Adams, up to the time of his resignation, attended many meetings of the local fish and game clubs and chapters of the Izaak Walton League, and meetings of the Massachusetts Council of Sportsmen's Clubs.

Director Adams and Raymond J. Kenney, then Chief Warden, attended the so-called wild fowl conference held May 13 at the rooms of the Boston Society of Natural History. The meeting was a protest against the new regulations of the Bureau of Biological Survey, particularly the one limiting goose decoys to ten. Director Adams explained the workings of the Advisory Board and defended the Survey in its attitude.

Director Kenney attended the State convention of the Izaak Walton League of America at Pittsfield, August 28.

On November 2 Director Kenney announced a plan for the creation of an unofficial Advisory Council, representing State-wide organizations directly interested in the work of the Division, to advise with him on matters pertaining to the future policies of the Division. Invitations were sent to the following organizations, each of which sent representatives.

State Council of Sportsmen's Clubs  
Massachusetts Division, Izaak Walton League of America  
Massachusetts Fish and Game Association  
Massachusetts State Grange  
Massachusetts Fruit Growers' Association  
Massachusetts Farm Bureau Federation  
Massachusetts Audubon Society  
Federation of the Bird Clubs of New England  
Boston Society of Natural History  
Massachusetts Lobstermen's Association  
Massachusetts Fisheries Association

In the absence of a State-wide organization representing the shellfish industry, Mr. Gus J. Schroeder of the Schroeder-Besse Oyster Company of Wareham represented that branch of the marine fishing industry.

The group interested in inland fisheries and game met on November 12 and informally discussed questions concerning the future policy of the Division with respect to hunting and fishing. The marine fisheries group met on November 17 and went into a discussion of ways and means of furthering the interests of the marine and coastal fisheries.

#### ACTIVITIES OF LOCAL AND STATE ORGANIZATIONS

The local and State organizations operated along similar lines as in the past. Many of these organizations felt the effects of the general business depression through depleted finances and reduced memberships, but nevertheless they went forward in their various fields of usefulness with the same enthusiasm as in the past.

The New England Game Conference, sponsored by the Massachusetts Fish and Game Association, was held at Boston Jan. 24, 1931. It was attended by the fish and game commissioners and by a representative



group of sportsmen from all the New England states. The purpose of these meetings, which are now being sponsored annually by the Massachusetts Fish and Game Association, is to bring together all those in New England who are interested in wild life protection, for a mutual discussion of their problems and to effect uniformity in non-resident hunting and fishing licenses throughout the New England states. At that meeting a paper was read by Director Adams entitled, "History of Quail Breeding in Massachusetts."

The Council of Sportsmen's Clubs of Massachusetts and the State Division of the Izaak Walton League assisted the Division in numerous ways during the year, and its indebtedness to those two State-wide organizations and their local units for their helpfulness, is acknowledged.

The Massachusetts Fish and Game Association was particularly active in the interest of the wild fowl gunners, and carried on considerable correspondence with the Bureau of Biological Survey at Washington in an attempt to secure modified regulations, reaching a climax in the public meeting on May 13, already mentioned. As a result of this meeting a representative committee of wild fowl gunners went to Washington to interview the Secretary of Agriculture. The same association cooperated with the Bureau of Biological Survey in the collection of statistics on woodcock through the medium of questionnaires. It likewise continued to sponsor the New England Ruffed Grouse Investigation which has been in progress since 1925.

#### ACKNOWLEDGEMENTS

Additional gifts and the balances of previous gifts are reported on, as follows.

##### *The Merrill Pond System Fund*

There were brought over at the close of 1930 a balance of 25c. from contributions for the pond system, and \$100 given by the Dighton Fish and Game Club in 1930 to be used at the Division's discretion (recorded in the 1930 report under "Other Gifts"). This was assigned by the Director for work at the Merrill Pond System.

To the foregoing was added during the present year \$100 from the Westboro Fish and Game Association, \$25 from the Asneconick Pond Association, and \$100 (for use at discretion, and assigned by the Director to the Merrill Pond System Fund) from the Dighton Fish and Game Association, making \$325.25 available for use in the present year. Of this \$196 was spent for pond development and \$129.25 is held to apply on the purchase of land to complete the pond system.

##### *Montague Fish Hatchery Fund*

A gift of \$85 was received from the Franklin County League of Sportsmen's Clubs, which together with \$25 brought over from last year made \$110 available, from which \$60.50 was expended for replacing wooden dams with concrete. The balance of \$49.50 is held for work in new construction.

##### *Amherst Fish Hatchery Fund*

The \$307.25 brought over from the last fiscal year is held to apply on the purchase from Superintendent Louis Horst of three acres of land adjoining the hatchery grounds.

##### *Other Gifts*

The \$50 gift of Isaac Sprague, Esq. in 1929 for the development of Carr Island was used for making and erecting a warning sign and for the purchase and planting of food-bearing shrubs.

The 91c. remaining from the gift of S. W. Carey, Jr. for purchase of ruffed grouse and quail was used for postage charges on those purchases.

The \$15 contributed by the Watcha Club for opening Oyster Pond on

Martha's Vineyard, brought over from last year, was applied on the bill for opening the pond during the present year.

(For a report on the \$100 contributed in 1930 by the Dighton Fish and Game Club, on hand at the close of last year, see "Merrill Ponds Fund" above).

In the annual report for 1926, four individual contributions of \$2 each were recorded for the acquisition of permanent wild life sanctuaries. This money has been held in the Trust Fund, anticipating further contributions for the same purpose. Such not materializing, the money was spent this year for food-bearing trees and shrubs set out on the Boxford Reservation.

The town of Falmouth again paid the expense of the transfer of fish by one of the salvage units from Long Pond, Falmouth, to local open waters.

The town of Webster appropriated a sum of money for stocking local waters with fish, paying the bills for the work.

### ENFORCEMENT OF LAWS

With the resignation on July 1 of former Director William C. Adams and the appointment of former Chief Warden Raymond J. Kenney to the directorship, the law enforcement section passed immediately into the charge of Field Supervisor Carl G. Bates as Acting Chief Warden (who became Chief Warden a month later), and Warden Forrest S. Clark took over the supervision of the field force as Field Supervisor.

Several transfers were effected on April 1. Warden Walter D. Gilmore was transferred from the Fall River to the Lynn district; Warden Donald Ellershaw from the Lynn to the Palmer District; Warden John T. Whyte from the Palmer to the Springfield district; Warden Ernest P. Anyon from the Springfield district to the Buzzards Bay district; and Warden Gordon E. Spofford from the Buzzards Bay to the Martha's Vineyard district to fill the vacancy caused by the resignation of former Warden Karl E. Eckert. On September 15 Warden Arthur F. Hughes was transferred from the Nantucket district to the new district in Franklin County.

Four permanent wardens were added to the force and assigned as follows: April 1, Daniel F. Moriarty to the vacant Fall River district, with headquarters at Fall River; September 15, Daniel A. Durrum to the Braintree district formerly covered by Field Supervisor Clark, with headquarters at Braintree; John E. Buckley to the new district in Berkshire County, with headquarters at Lee; and William H. Waterhouse, to the vacant Nantucket district.

Two new districts were created, comprising towns taken chiefly from two of the largest districts in the State (which were well over 400 square miles in area). In the making of these new districts Berkshire County, formerly divided into three districts, has been changed in its entirety and a new (fourth) district created with Lee as its headquarters. This has reduced the size of the other districts, thereby increasing the efficiency of the law-enforcement agency. The creation of a new district in Franklin County, with Greenfield as its headquarters, splits what was the largest district in the Commonwealth.

The court work for the year was as follows: number of cases, 1,401; convicted, 1,320 (of which 254 were filed); discharged, 60; appealed, 21; fines imposed, \$15,600.

In addition to the penalty imposed by the court, the sporting or trapping license of the person convicted becomes void and no license can be legally secured until after one year from the date of conviction. Licenses revoked: resident sporting, 308; resident trapping, 12; alien sporting, 1; minor trapping, 2; total licenses revoked, 323.

The district courts have co-operated to a high degree with the enforcement officers of the Division; but in many cases, due to economic con-



ditions, it was deemed advisable by the courts to suspend fines which were imposed, or to withhold the imposition of fines, due to the inability of the defendants to raise the necessary money to pay them.

The Division is indebted to the Department of the Attorney General and more particularly to Assistant Attorney-General Charles F. Lovejoy for advice given and assistance rendered in connection with the enforcement of the fish and game laws and other matters requiring legal advice.

The District Attorneys of the various counties have likewise assisted the enforcement officers in the disposition of cases appealed from the lower courts, and their cooperation has been of great value.

A survey of the records shows that the "no license" fishermen lead the list of convictions with 680 cases. There seems no excuse for this type of violation, as a license is required to fish in all of our inland waters, but there is an element among the sporting public that likes to take that proverbial chance.

Cases against aliens in possession of firearms numbered 41. Upon conviction such cases draw substantial fines.

A number of important trawling cases resulted in the defendants paying fines that should make this particular type of fishing unpopular. The outstanding case resulted in fines totalling \$150 for the two participants.

Outstanding in the enforcement work for the past year has been the number of persons apprehended for hunting deer illegally—the total number brought before the courts being 29, with several cases to be disposed of before the higher courts. The deer season of December, 1930 proved to be about a normal one in so far as violations were concerned, with illegal deer hunting more in evidence during October and November of the present year. Hunting deer with the aid of a light still continues to be a source of complaint, as well as hunting deer by the aid of dogs on the Cape and in Plymouth County. It is difficult to make much headway with some of these cases as the complainants do not wish to appear as witnesses, but public sentiment, more particularly during the present year, seems to be against such practice.

The number of cases entered against aliens found in possession of firearms remains about the same as for last year.

There were several outstanding cases of netting birds. On a complaint for operating two bird nets a fine of \$180 was imposed, and in numerous other cases where song and insectivorous birds had been shot, the guilty persons were apprehended and substantial fines imposed.

The latest addition to our trapping laws became effective Dec. 4, 1930 at which time practically all trapping, particularly for muskrats and mink, had ceased by reason of cold weather and the water having frozen over. That being the case, little could be known until the opening of the season on Nov. 1, 1931 as to the effect of this law upon the activities of the trappers. Trapping as a whole has not been carried on as extensively as in other years. A number of cases have, however, been brought before the courts, and substantial fines imposed where the traps would not take an animal alive and unhurt or kill it at once in the taking.

In a case testing the constitutionality of the so-called humane trapping act and the rights of land owners, Joseph H. Higgins of Barre was apprehended on February 18 while setting six steel traps on his own land in various locations and distances from buildings and cultivated plots. Mr. Higgins was arraigned in district court on March 6 at Barre, and was found guilty of setting traps in violation of Section 59-A, Chapter 131, General Laws, as most recently amended by Section 242 Chapter 426, Acts of 1931. A fine of \$50 was imposed on each of the six counts. On five counts Mr. Higgins was charged with "using, setting, or maintaining a trap not designed to kill an animal caught therein at once or take it alive and unhurt." Mr. Higgins appealed from the findings of the court and the case was tried on May 26 and 27 before the Superior Court sitting in Worcester. The finding by a jury was not guilty on three and guilty



on three counts. Mr. Higgins took exceptions to the Massachusetts Supreme Judicial Court. On September 21 the Full Bench of Supreme Court sitting at Worcester heard the arguments of the counsel (District Attorney Edwin G. Norman for the Commonwealth and Mayor George C. Sweeney of Gardner for the defendant) on the exceptions but no decision has been handed down.

Very creditable work was done by a number of the deputy and town wardens, but as a whole this service has fallen short of its mark and does not seem to warrant continuance.

In addition to the complete motorization of the wardens for land travel they have been completely equipped for patrol of the water areas within their districts by the addition of boats, canoes and outboard motors.

The forest fire problem has not been as acute this year, due to increased rainfall over that of the past two years, which has aided in keeping the trout streams at a higher level, and making it unnecessary for the wardens to carry on salvage operations to save fish life.

### NEW LEGISLATION

Following are listed the laws relating to fish and game enacted during the session of 1931. No important changes were made, although several acts were passed as perfecting amendments to the general revision of the fish and game laws last year.

Chapter 7 empowered the selectmen of Newbury, Rowley and Georgetown to grant permits authorizing the taking of striped bass from the Parker River and its tributaries by bowed nets under regulations prescribed by them. This law was enacted primarily to afford unemployment relief in the towns mentioned, and became inoperative after April 1.

Chapter 21 provides for the issuance to officials in charge of domestic water supplies, of permits for the killing of gulls and terns found polluting such waters.

Chapter 27 makes the open season on hares and rabbits from October 20 to the last day of February in Nantucket County, with the season for the rest of the counties from October 20 to February 15.

Chapter 71 amended the law which heretofore prohibited fishing on the Lord's Day so as to permit fishing except for commercial purposes. Although this amendment is not part of the fish and game laws, it is of considerable interest to the fishermen and received widespread approval.

Chapter 183 grants consent of the Commonwealth of Massachusetts to the acquisition of migratory game refuges by the Federal government, if at any time the Federal authorities deem it advisable to establish migratory bird refuges in Massachusetts.

Chapter 243 authorizes the Department of Public Works to convey certain rights and interests of the Commonwealth in Benson's Pond in the town of Middleborough.

Chapter 263 enables minors between the ages of 15 and 18 years to obtain a special fishing license at a cost of \$1.25, whereas heretofore all persons over fifteen years of age were required to purchase the straight sporting license at \$2.75 for either hunting or fishing.

Chapter 270 legalizes field trials at any time of the year under permit from the director and under such regulations as he may prescribe.

Chapter 272 allows the killing on Sunday of any bird or mammal damaging or about to damage property, subject to the same conditions and restrictions as would render such killing or attempted killing lawful on a secular day, and legalizes possession or carrying of a rifle or shotgun for such purpose or for sports conducted under the law authorizing Sunday sports.

Chapter 291 provides that a person may sell moose, deer, caribou or elk legally killed by him outside the Commonwealth and legally transported therein, when bearing the game warden's tag from the State or country in which it was killed.

Chapter 306 authorizes and directs the County Commissioners of Plymouth County to lay out a right of way for public access to Dunham's Pond in the town of Carver.

Chapter 393 contains perfecting amendments to the revision of the fish and game laws enacted in 1930.

Chapter 436 contains perfecting amendments to the revision of the fish and game laws enacted in 1930, among the most important of which are—

A reciprocal clause was written into the license law, requiring non-residents to pay a fee similar to the fee charged applicants from this State who desire a similar privilege in the home state of the non-resident.

The use of motor vehicles or artificial lights was prohibited for hunting any bird or mammal; except that raccoons, skunks or unprotected mammals may be taken by the use of artificial lights at the proper season and in the proper manner.

No person can obtain a new license unless he first makes a statement of the number of birds or mammals, if any, taken by him during the previous year.

Authorization was granted the Division to acquire lands for the establishment of public shooting grounds to match the authorization granted last year for the establishment of public fishing grounds, whenever funds were available for the purpose or the wisdom of establishing such areas becomes apparent.

#### RECOMMENDATIONS FOR NEW LEGISLATION

Because of the general revision of the fish and game laws during 1930 by a Special Recess Commission, together with the several perfecting amendments which were enacted in 1931, no further changes in the laws are recommended at this time.

#### EDUCATION AND PUBLICITY

There was an increased demand, particularly from agricultural fairs, for exhibits showing the work of the Division in wild life conservation, but it was necessary to refuse these requests because of limited personnel and lack of funds. Until such time as the Division has additional resources it will be impossible to meet these growing demands. Extensive exhibition work at the present time would seriously affect the law enforcement or propagation work at a time when these two units are operating at top speed.

The only displays were at the New England Sportsmen's Show and at the Eastern States Exposition in Springfield, described hereafter in the report of the Supervisor of Fish and Game Permits and Claims.

As part of the routine of the Division, timely notice was given in the press on matters of particular interest to the sportsmen. Beginning in August a plan was developed for regularly supplying information to the press and conservation journals on carefully selected subjects pertaining to the work of the Division. The regularity of these releases enabled the newspapers to devote a considerable space to the articles, and in a great many cases the press courteously quoted the articles verbatim.

The usual amount of lecture work was done by the Director and by the Supervisor of Fish and Game Permits and Claims.

#### BIOLOGICAL SECTION

##### GENERAL

The year's activities were divided among the problems directly connected with the stocking of inland waters and covers and work relating thereto; a limited amount of field work having to do with the study of fish diseases; the sterilizing of trout rearing pools; fish tagging; and a check-up on a white hare survey prepared several years ago. In addition, vari-



ous biological routine and miscellaneous problems were handled as they came to our attention.

Space has been assigned in the new quarters at 20 Somerset Street for the installation of a laboratory. The work is in progress and the room will be ready for occupancy early next year.

The appointment of a Junior Fish and Game Biologist was authorized to make possible more extensive field work, and Mr. Standish Deake was appointed provisionally on August 3.

### FIELD WORK

Consideration was given to the study of the proper waters and covers in which to liberate stock reared at the game farms and fish hatcheries. This is a very important item in the biological work.

With the assistance of the wardens, much time was given to completing the records of the locations and proper names of all inland lakes and streams. This preliminary work is of great value as a forerunner to an extensive study of all water systems to be started next spring, and which will require several years' work to complete.

A number of specimens sent in by the general public were autopsied and the many inquiries on miscellaneous biological problems were handled.

About 1,500 brown trout ranging from 6 to 9 inches were tagged and released in streams to get accurate knowledge of their movements, rates of growth, and spawning habits. Two methods of tagging were used; first, a numbered metal tag affixed to the tail fin; second, a numbered bright red celluloid  $\frac{1}{4} \times 1\frac{1}{4}$  inch tag, inserted into the abdomen of the fish. Tagging by the abdominal insertion method has not been done before except on salt water fishes. Public notice has been issued requesting the return of these tags to the Division, with various items of information.

A survey of the white hare cover in the State, made some years ago by the wardens, was carefully checked, to be used as a basis for future distribution of these animals. Areas suitable for trapping cottontail rabbits were investigated and in many instances consent to trap was received from the owners. This work will be pushed forward as weather conditions permit.

Considerable service was given to the club trout rearing pond units through Superintendent Merrill. Data is being compiled to determine the results, after a five-year period, of the clubs' rearing activities and the investigation includes a study of the losses at these rearing pools from natural enemies and drouth conditions.

Generally speaking, there were fewer complaints this year of fish becoming stranded on account of low water conditions, and there were very few cases reported of dead fish in the natural great ponds.

Two salvage crews operated as usual, and permission was received to trap in many closed waters never before seined. (See section on Propagation of Fish and Game—Fish Salvage Units).

### DISTRIBUTION

An intensive study of the waters and covers to be stocked annually with stock obtained by the salvage units, propagated at the fish hatcheries, pond units, and game farms, is of the greatest importance in improving fishing and hunting.

### FISH AND BIRD DISEASES

The usual routine pathological examinations of fish, birds and quadrupeds sent to the Division were made by Dr. E. E. Tyzzer and Dr. Hans Theiler of the Harvard Medical School, and Dr. David L. Belding of Boston University School of Medicine. The opportunity is taken to thank them for the valued assistance rendered.



In April an epidemic of furunculosis broke out among the trout at the Sandwich Fish Hatchery, the first appearance of the disease at this hatchery. Dr. H. S. Davis, Pathologist of the U. S. Bureau of Fisheries, came to the station to advise with the biologist and the superintendent in treating the fish, as did Dr. David L. Belding, and acknowledgement is made of our indebtedness. The disease was also present in epidemic form at the East Sandwich and Sutton Fish Rearing Stations. This necessitated the adoption of stringent control measures for the eradication of the disease, which were carried out under the direction of the biologist by clearing the stations of fish, disinfecting the ponds and pools and giving them a rest period before resuming use. During this period a lengthy series of experiments was made to determine upon a suitable disinfecting agent and technique. (For details, see the reports of the respective stations).

### SUPERVISOR OF FISH AND GAME PERMITS AND CLAIMS

As explained in the last report, this section of the work is in charge of a Supervisor of Fish and Game Permits and Claims and covers handling of claims against the Commonwealth for deer damage; issuance of special permits (other than those relating to marine fisheries); supervision of wild life sanctuaries; investigation of the need of closing open seasons on any species of fish or game by reason of adverse conditions; purchase of equipment. To the supervisor falls also most of the lecture work; all exhibitions; and various miscellaneous duties.

### DEER DAMAGE CLAIMS

Although not as high as some years, the amount paid for deer damage claims shows an increase over last year, bills having been presented in excess of the \$6,000 appropriation. One very large claim (\$2,273.73) was paid on 879 injured trees in an orchard of 4,500 high-grade apple trees. Large claims, or doubtful ones, are given personal attention, even though the required certificates are filed. Small claims predominated, as usual.

The total payments amounted to \$6,469.82, covering 94 claims.

Under Section 108, Chapter 131, General Laws there were 79 deer shot while damaging crops.

With a view to lessening the amount of damage, experiments have been tried with various repellents, with varying results, the best coming from those giving off a strong scent. Ordinary tar paper attached to the limbs of the trees served the purpose very well. Experiments on a large scale are being conducted in the orchard referred to above, and others will be tried in orchards where damage has been heavy in the past.

The system in use of tagging the trees with metal tags showing the percentage of damage allowed, together with the removal and destruction of trees on which one hundred per cent damage has been paid, protects the State very effectively from future claims for injuries for which compensation has already been given.

### PERMITS

The State laws authorize the issuance of seventeen kinds of permits in regard to either birds, animals or fish. The investigation of the applications for such permits, and their issuance and following up, consumes considerable time. Those calling for permits to hold wild creatures in captivity for breeding lead in point of numbers, and are all investigated to ascertain whether a *bona fide* effort is to be made to increase the supply. If reasonable and not contrary to law, these requests are not refused; but no permits are given to known violaters, or to persons who expect special privilege to take wild creatures out of season to start breeding activities. Nearly all applicants plan to breed with stock either purchased from a licensed holder, or obtained legally in open season.

There are 1,160 such breeders' permits in force (good until revoked) at the close of this report. A questionnaire sent this year to the over 2,000 holders of permits of this class, which had been in effect for many years without systematic check-up, revealed that many did nothing after permission was given, while others had carried on with enthusiasm and substantially increased their stock. Inactive permits were cancelled. The one consistent increase was in the breeding of decoy ducks and geese (for until this year an unlimited number could be used around gunning stands); but the promulgation of the Federal regulation limiting the number to ten at any one stand caused many persons to dispose of their geese. Attempts to breed fur-bearing animals on a large scale have been recently started, but it is too soon for results to be apparent.

There were three hundred gunning stand licenses at \$2.75 each issued this year. It had been thought that, on account of the shortening of the wild fowl season and the reduction in the number of decoys which might be used, many stands would not open; but the number of licenses issued exceeded those of last year, indicating that the majority intended to make the best of the situation.

Ninety-five permits at \$5 each were issued for taking shiners for bait.

Eighty-nine permits (without cost, and good until revoked) are in force for taking protected birds, their nests and eggs, for scientific purposes. The reports received on these permits record the taking of 161 protected birds and the eggs of 272 protected species.

Fifty-one permits are in force (issued without charge and good until revoked) to sell or have in possession fish artificially propagated and maintained.

In addition to the above, a large number of permits (without cost) for a variety of special purposes were issued, covering mostly the importation of protected species; possession of such species; liberation of imported stock; mounting specimens; and other minor permits.

One hundred and fifteen permits (good until revoked) are in force for banding birds by those cooperating with the U. S. Biological Survey in its studies of bird migration.

For work by the Supervisor on reservations, see Birds and Animals—Other Sanctuaries.

#### EXHIBITS

The Division put on an exhibit at the New England Sportsmen's Show held at Mechanics Building in Boston. The exhibit consisted of a family of live quail, with an electric brooder in which they were reared, standing by. Adult pheasants were shown in a large cage. A trough with trout eggs hatching showed how trout are produced in quantities. Eight aquariums, placed along the wall, gave a close-up view of nearly all of our food and sporting fish, identified by signs and a large wooden trough displayed brook trout of several sizes. A new feature was a 10 x 10 foot canvas pond in which several hundred pond fish, pickerel, pouts, sunfish and crappie, were swimming. In a darkened corner the automatic balopticon gave a continuous show of seventy lantern slide views of the game farms and fish hatcheries. The marine fisheries section displayed many varieties of shellfish and marine curiosities,—a new departure which drew considerable attention.

An exhibit was put on at the Eastern States Exposition in West Springfield, using the 12 x 27 foot pond which was made for that location, with nearly a thousand pond fish on view for the many who have little opportunity of seeing these fish at close range. In addition to small mouth bass and white perch a number of other varieties of fish life were displayed, such as shiners suckers, crawfish and other unusual creatures. A large wooden two-section trough showed adult brown and brook trout. An entirely new feature was an aquarium containing a large number of fair sized brook trout, illuminated with red, amber and green lights. The play of lights on these fish drew many favorable comments. Back of the aquari-



ums were cut-out pictures representing a woodland and lake scene with varying flashing scenes illuminating a sign suggesting that sporting licenses should be purchased.

About the usual number of talks illustrated with lantern slides, were given.

## WILD BIRDS AND ANIMALS

### FIELD OBSERVATIONS

During the winter of 1930-31 the eastern part of the State was very free from deep snows in the quail areas, making feeding unnecessary. The middle and western portions had deep snow and continued cold—conditions unfavorable for pheasants though not for grouse. No feeding program was undertaken except to authorize the wardens to purchase grain for feeding at their discretion. Past experience has shown it impracticable to handle feeding through the central office, and better success is promised if done by wardens through local agencies. It is now a regular practice on the part of many clubs and private individuals to feed the wild stock. (For account of planting duck foods, see section on Water Fowl).

While there was a week of heavy rains and certain other seemingly unfavorable weather during the breeding and rearing period of the upland game birds, nevertheless the numerous and good-sized broods of grouse, quail and pheasants seen in the covers proved it to have been an average breeding season. Whether they were hatched early enough to withstand the unfavorable weather, or whether hatched after the rains, is not known; but the former seems probable.

No fire menace existed during the spring and early summer as has been the case so frequently in the past, and the number of forest and brush fires is reported by the State Fire Warden as much less than usual. This meant less destruction to bird and animal life and an uninterrupted trout fishing season.

The amount of posted land remains about the same as for the past years, though with some sections gaining. Some of this additional posting has been caused by the gunners' utter disregard for the safety of persons living in the immediate vicinity of the covers and possible damage to property. Whether it is due to ignorance as to the danger or to their general inexperience in the use of firearms is difficult to say.

### STATISTICS OF GAME AND FUR-BEARING ANIMALS TAKEN

For the first time it is possible to publish figures showing at least a certain proportion of the amount of game and fur-bearing animals of all species taken by hunters and trappers. Previously such figures were available only for deer, pheasants and fur-bearing animals.

The original law (Section 8, Chapter 131, General Laws) provided, "Each person licensed to hunt or trap shall within thirty days succeeding January first in each year make a written report to the Director at the office of the Division, stating the number of birds or mammals taken by him in the preceding calendar year, or stating that no such birds or mammals were so taken, as the case may be."

Thus the reports for the 1930 kill were not received until the following year, delaying publication by that length of time. Although out of the total of 122,446 sporting and 10,201 trapping licenses sold in 1930 only 48,003 returns were received (and of those 20,304 reported taking nothing), the figures shown by this partial report are illuminating.



Gallinules . . . . .	244
Rails . . . . .	483
Wilson snipe (Jack snipe) . . . . .	2,339
Fresh-water coots (Mud hens) . . . . .	1,105
Ducks (including skunk head, butterbill and white winged scoters, commonly known as "coots") . . . . .	56,151
Geese . . . . .	5,556
Brant . . . . .	3,113
Woodcock . . . . .	18,713
Quail . . . . .	7,522
Ruffed grouse . . . . .	29,883
Pheasants (cock birds) . . . . .	13,631
Deer . . . . .	1,562*
Cotton-tail rabbits . . . . .	150,391
White hares . . . . .	16,616
Gray squirrels . . . . .	42,501
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Total head of game taken . . . . .	349,810
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Muskrats . . . . .	41,758
Minks . . . . .	1,367
Skunks . . . . .	13,329
Red foxes . . . . .	3,600
Gray foxes . . . . .	402
Raccoons . . . . .	1,864
Weasels . . . . .	1,970
Otters . . . . .	52
Canada Lynx (loup cervier; <i>Lynx canadensis canadensis</i> ) . . . . .	4
Bob cat (wild cat or bay lynx; <i>Lynx rufus rufus</i> ; not to include wild hunting house cats) . . . . .	74
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Total pieces of fur taken (by 5,036 persons) . . . . .	64,420

\* See discussion of this figure in the section on Deer.

That there is good hunting in various parts of the State is borne out more specifically by the individual reports rather than by the aggregate totals. A brief statement of some of the individual bags follows:

<i>Species</i>	<i>Number of hunters who secured the bags noted in next column</i>	<i>Birds or mammals taken by each</i>
Gallinules . . . . .	10	10-15
Rails . . . . .	13	10-15
Wilson Snipe . . . . .	1	100
	1	60
Fresh-water coot . . . . .	1	125
	4	52-75
Ducks . . . . .	1	287
	10	200-250
Geese . . . . .	1	192
	4	125-168
Brant . . . . .	3	46-52
Woodcock . . . . .	59	18-28

Quail . . . . .	23 50	The bag limit of 20 15-19
Ruffed grouse . . . . .	144 441	The bag limit of 15 10-14
Gray squirrels . . . . .	270 816	The bag limit of 15 10-14
Pheasants . . . . .	404 890	The bag limit of 6 4-5
Cotton-tail rabbits . . . . .	4 1	100-190 301
White hares . . . . .	1 3	80 48-75

The law requiring reports to be made was amended by Chapter 436, Acts of 1931 so as to read, "No person shall be granted a sporting or trapping license unless he files with the town clerk or the director a written report upon blanks furnished by the director stating the number of birds or mammals, if any, taken by him in the preceding calendar year." This removes the penalty heretofore imposed upon license holders who failed to report on or before January 31 of each year, and should result in more complete data.

### MIGRATORY BIRDS

#### *Song and Insectivorous Birds*

Our wealth in birds is little appreciated by the average person, or the fact that without this beautiful portion of our wild life resources the world would be a far less pleasant place in which to live. The warden force is constantly on the alert for destroyers of this part of our natural heritage which is enjoyed by nearly every one, though with but little realization that the singing of the birds is the smallest part of their usefulness. Little can be done in the way of caring for the song and insectivorous birds other than to feed the few species that remain during the winter, at such times as the snow covers the weeds that furnish seeds for them to eat. Severe cold never kills wild life if it has a full stomach, for therein lies warmth.

#### *Migratory Game Birds*

SHORE BIRDS.—It seems that the draining of the areas along the shores has had its effect upon the shore birds that were appearing in increased numbers until this year's migration, and many places that have been their feeding grounds are now dry and the birds fail to stop.

Golden and black-breasted plover continue to show increase under protection, with one especially heavy flight of black breasted plover reported. Killdeer plover appear to be nesting over a wider range, which indicates a general increase. Upland plover appeared in Berkshire County for the first time in many years. Four pairs nested in Williamstown and their numbers were increased, during the breeding season, to seventeen.

Snipe for some unexplainable reason did not appear in usual numbers during the fall migration, but no real shortage of these birds is evident. It is entirely possible that mosquito extermination work has destroyed some of their feeding grounds, and that the birds did not stop here as usual.

Woodcock appeared in usual numbers in the spring. They are breeding in the State in increasing numbers. The western part of the State enjoyed specially good gunning during the first week of the open season, with but few birds showing up during the next three weeks.

Rails appeared in larger numbers than were reported last year, which no doubt may be laid to the fact that an increase in rainfall made conditions more favorable to these birds. Rails are not highly considered as game species in this State.

Sandpipers continue to increase, and their range continues to be throughout the entire State.

Winter and summer yellow legs have not been up to average numbers this season. They have, however, appeared in large numbers in spots, and it is entirely possible that with no feeding grounds they pass up our shores entirely. While it is too early to so state definitely, seemingly the extensive drainage of marsh lands along our coast has reduced the feeding areas formerly used by these birds. Yellow legs, however, appeared in their usual numbers inland, but these numbers are necessarily small compared to the great flights previously occurring along the shore.

Curlew appear to be steadily increasing, although the increase is not large. About the average number have been observed during the fall migration.

**WATER FOWL.**—The regulations promulgated by the Biological Survey of the United States Department of Agriculture (announced in April), made a drastic change in the regulations so far as goose shooting was concerned. Previously an unlimited number of live goose decoys could be used for the purpose of enticing wild geese. Because of the alleged abuse of this practice in some parts of the country the Federal officials prescribed a rule this year that not more than ten live decoys could be used at any gunning stand or blind. This drastic regulation provided a serious handicap to goose shooting in Massachusetts, and was not agreeably received, particularly in view of the fact that no claim was made of the abuse of the former privilege in Massachusetts, or in any of the other New England states. In addition, the water fowl season was reduced by fifteen days and the season was planned to close on December 31, where heretofore it had extended to January 15. During the breeding season severe and long-continued drouth conditions had brought about a serious shortage of water fowl, and as a result the regulations were amended, on August 25, providing that the open season should be reduced to one month, and October was the month selected for Massachusetts. After wide-spread disapproval had been registered at Washington, the Federal officials again (on September 12) amended the regulations, providing that ducks and geese could be hunted in Massachusetts during the month of November.

The flight of geese from December 1, 1930 (when this report opens) to the close of the season on January 15 following was about average. In the fall of 1931 there was an exceptionally heavy early flight, and again from the middle of November to the end of the month (when this report closes) their numbers were far above average. The lesser snow geese put in an appearance for the first time in many years, and one adult specimen that was shot and confiscated was turned over to the Boston Society of Natural History.

The data collected concerning the gunning stands showed the number of stands licensed to be 327; number of reports received, 318; ducks shot, 9,122; geese shot, 2,804; live duck decoys used, 6,023; wooden duck decoys used, 5,693; live goose decoys used, 1,956; wooden goose decoys used, 5,094. In considering the above figures it should be borne in mind that the season this year covered only one month instead of the usual two months.

Black ducks bred throughout the State more extensively than last year, with some of the native ducks gone with the opening of the season on November 1. For the so-called "red leggers" the season was entirely too early, and only a few had put in an appearance when the season closed on November 30. Wood ducks continue to increase, but were practically all gone at the opening of the season. Mallard, teal, pintail and canvas-



back ducks are greatly in the minority and add little to the sportsman's bag. Red-heads and blue-bills show little indication of increasing their numbers along our coastal areas.

Experimental work with wild duck foods was continued with a planting of 80 pounds of wild rice and 20 of smartweed. For several years these foods have been planted along the Sudbury River and marshes near Hurd's Pond and along the Broad Meadows section of the Sudbury River, with seed bought by the Division, transportation and planting being taken care of by the Framingham Fish and Game Club and the Middlesex County League of Sportsmen's Clubs. A careful check showed that the seed produced good results where there was a depth of water from two to twelve inches, with a slight current; planting where there is no moving water was found useless; and seed landing on other plants will not take hold. A planting of 400 sago tubers and 30 pounds of millett seed made (with the assistance of the Quannapowitt Sportsmen's Association) in Lake Quannapowitt and in the marshes along the Saugus River below the lake, did well, but it is inadvisable to continue as local sentiment, particularly on the part of the outboard motorists, opposes the planting of weeds that may spread.

#### *Migratory Non-game Birds — Gulls and Terns*

Gulls and terns continue to hold their own with an apparent increase in various sections from which complaints have been received concerning the abundance of these birds. These complaints refer not only to the defilement of pleasure boats along the shore but to the destruction of small shellfish and the pollution of public water supplies. The importance of the latter complaint prompted the Legislature to enact legislation (Chapter 21, Acts of 1931) authorizing the officials in charge of domestic water supplies to kill gulls and terns which in their judgment, are likely to pollute the water supply. An investigation was commenced by the U. S. Bureau of Biological Survey to determine whether or not regulations should be issued allowing the killing of these birds if found doing damage on shellfish areas, but sufficient information has not been obtained up to the present time to warrant a finding.

#### *Federal Migratory Bird Refuges*

On the petition of the Massachusetts Fish and Game Association the Legislature enacted Chapter 183 which granted consent to the acquisition of migratory game refuges in Massachusetts by the Federal government. The purpose of this legislation is to enable the Federal government to establish these refuges at any future time without seeking special authorization of the Legislature. A survey of possible sites was made by the U. S. Bureau of Biological Survey as part of their plan of making a similar survey in every State; but no action has been taken toward the establishment of a refuge here. Massachusetts is primarily a flight state as far as the migratory birds are concerned, and it is probable that the limited funds now available by the Federal government for the establishment of refuges would be devoted to this purpose in other parts of the country where breeding and wintering areas will be secured and set apart.

#### UPLAND GAME

There has been a marked increase of interest in field trials during the past year, indicating the desire of the sportsmen to develop fine hunting dogs. The law prohibiting the use of hunting dogs on protected game birds or animals during the period from April 1 to September 1 interfered somewhat with the holding of these trials, and as a result Chapter 270 was enacted as an emergency measure granting the Director the right to issue permits for the holding of field trials during the period referred to. This act became effective immediately upon its approval by the Governor on April 30 and four permits were issued.

For the purpose of encouraging these trials, in past years the Division maintained a policy of supplying pheasants for such purposes; but as these trials have now become well established it seems desirable to place them on a self-supporting basis rather than to conduct them with State-owned birds. Accordingly a plan was adopted this year of supplying the field trial clubs with one-half the number of birds required, with the understanding that a corresponding number would be obtained from outside sources. There is no doubt that eventually these trials will be entirely self-supporting because of the increased number of hunters desiring to enter their dogs.

**PHEASANTS.** — With the liberation of the first of this year's hatch around September (discussed more fully under Distribution), rather better shooting was assured for the year as the young birds were matured by the opening of the hunting season. The results of late summer liberations can be judged better after this policy has been followed over a period of years. Reports indicated good shooting in the natural pheasant covers, particularly during the early part of the season. But as the season progressed there appeared to be a shortage, due undoubtedly to the fact that the remaining birds had been so strenuously hunted they had acquired the ability to cover up, although hunted by a trained bird dog. In the eastern part of the State reports indicated an excess of male pheasants, but elsewhere there appeared to be the usual excess number of female birds in the covers.

On the island of Nantucket the work of stocking with pheasants which has been carried on over a period of years, has proved very successful, and this year large broods of young have been seen.

Now that the possibility of saving the heath hen is past, the island of Martha's Vineyard has been supplied with pheasants for liberation, the same as any other part of the State. The birds appear to be doing very well, are scattered all through the covers, and a great many broods of young were seen at different sections of the island this summer.

**QUAIL.** — The severe winter apparently did not affect the quail to the extent that might have been expected. The southern portion of the State afforded more than an average amount of shooting, and in some localities exceedingly large covies were located. The increase of quail in some of the closed counties, particularly Norfolk, Middlesex, Worcester and Essex, has caused some of the sportsmen in these counties to recommend an open season during the coming year, but this opinion has not become sufficiently crystallized to insure legislative action, as the majority of the sportsmen still feel that the quail should be given additional protection in all of the closed counties, with the possible exception of Norfolk.

The fifteen pairs of quail liberated on Nantucket in the spring of 1930 appear to be doing well. During the summer following their liberation at least three broods of young were seen at widely scattered points, and this year the district warden saw several birds with young at different sections of the island. There were liberated on Nantucket 52 adults in the spring and 304 young quail in the fall from the game farms. The birds were seen at intervals after liberation and appeared to be doing well.

Again this year, in connection with spring field trials, the Setter Club of New England liberated Mexican quail on the Chamberlain Farm in Concord, numbering 98. They were strong, healthy birds and bred extensively. In connection with field trials the Needham Sportsman's Club liberated 23 Mexican quail on the Babson Institute grounds in Needham.

**RUFFED GROUSE.** — Over most of their range grouse have made a very good showing. The scarcity of two years ago seems to have been materially lessened, with good shooting enjoyed over most of the State. There will always be spots from year to year where grouse will be scarce. The ideal method of handling seasons would be to give the Director authority to declare an open or a close season according to the conditions



existing; this, of course, with the consent of the Governor and Council, which would assure the sportsmen every protection.

The outstanding feature of the grouse season was the general opinion that the birds were more wild than in past years. They seemed to be plentiful in some sections and scarce in others; but the bags were limited in the sections of abundance, due to the inability of gunners to get within gunshot, regardless of the type of hunting dog used. While many were able to obtain their daily bag limits, there is little doubt that sufficient birds remain in the covers to provide brood stock for the nesting season next year.

The results of the liberation of grouse on Martha's Vineyard last year were not very satisfactory. It is the opinion of all who handled the birds that it is doubtful if any survived more than a week after liberation, due to poor condition on arrival after the long journey, and heavy rains before the birds were acclimated.

Mr. S. W. Carey, Jr., imported and liberated at Quisset Harbor, Falmouth, 15 sharp tail grouse. These were purchased from William H. Mackensen of Yardley, Pa. who imported them from Alberta, Canada. These grouse were in excellent condition when liberated.

The New England Ruffed Grouse Investigation Committee started several years ago, continued its work sponsored by the Massachusetts Fish and Game Association. The report made in October of this year by Dr. A. O. Gross of Bowdoin College, Brunswick, Me., in charge of the investigation for the Committee, asks for a continuation of contributions of diseased specimens. The investigation shows a general increase in the numbers of ruffed grouse, the come-back after the low ebb of 1925-6 being now more or less general throughout the entire range of the grouse. The report states that the ordinary parasites and disease of grouse in New England are now fairly well known, as well as something of the geographical distribution and life history of some of the more important parasites. During the year grouse investigations were continued on the Canadian Labrador coast. (For experimental work on grouse breeding, see report of the East Sandwich Game Farm.)

DEER. — The deer season coming within the period covered by this report (two weeks in Berkshire, Franklin, Hampden and Hampshire counties, and one week in all other counties, except, Nantucket which was closed) was in some respects disappointing, with conditions against the hunter.

The figures following, while recording to the best of our information the number of deer killed, in all probability do not represent the actual kill, because a new method of collecting statistics of game taken, becoming operative for the first time, bred doubt in the minds of the hunters as to what reports really were required. As a matter of fact, the deer law required a report within 24 hours of all deer killed, and another section of the law required a report during the month of January, on the regular report sheet for *all* game taken (which included deer). But undoubtedly many hunters who reported within 24 hours assumed that report to be sufficient; and just as probably, too, many hunters withheld their reports until January (thus making the reports within 24 hours incomplete). Actual tabulation showed the reports within 24 hours to be 1,562, and those made in January only 1,056. Therefore the larger number was used as being nearest correct (though as stated above, very likely not complete.)

The total kill reported of 1,562 deer (856 bucks and 706 does) was divided by county as follows: Barnstable, 203; Berkshire, 410; Bristol, 24; Dukes, 1; Essex, 10; Franklin, 380; Hampden, 226; Hampshire, 120; Middlesex, 4; Norfolk, 2; Plymouth, 62; Worcester, 104; locality not reported, 16.

Data on damage by wild deer appears in the section covering the work of the Supervisor of Fish and Game Permits and Claims, in the earlier part of this report.



**SQUIRRELS.** — Gray squirrels continued in about the same numbers as for the past few years. Through the summer their numbers seemed to be greater and were spread through the State, with a marked reduction in their numbers again in October in some sections. The cutting off of the timber and the disappearance of the chestnut trees has considerable to do with their present status in Massachusetts. The red squirrel has been very plentiful this year. This squirrel is not considered a game animal and is the most destructive of the squirrel family. It is known that goshawks prey upon them as well as on chipmunks, which helps to keep their numbers down, and with some goshawks nesting in this State one pair can account for many squirrels, as well as untold game and non-game birds.

**HARES AND RABBITS.** — This season just past showed hares and rabbits plentiful, probably more being taken as their numbers seemingly were greater than for many years. Two cases occurred, one in Worcester County and one in Hampden County, where rabbits were brought into the Commonwealth from the middlewest where the disease tularemia is prevalent. No diseased rabbits were found in those seized in Worcester County, but 12 out of 34 seized in Hampden County proved to be affected with the disease. By legislation this year the open season on hares and rabbits in Nantucket County was fixed from October 20 to the last day of February, the season for the rest of the State remaining unchanged.

**FUR-BEARING ANIMALS.** — There has been a marked decrease in the trapping of fur-bearing animals as indicated by the issuance of 2,672 licenses against 10,201 last year, due undoubtedly to the market price of furs and the provisions of the humane trapping act adopted by the people at the last State election, which as a practical matter eliminates all trapping except in cases where a drowning set is used. There has been an increase in most species of fur-bearing animals, more particularly in the case of the skunk. These animals have become so numerous that they are invading the residential sections, and they are so numerous on the highways that a large number are killed by motor vehicles.

## RESERVATIONS

### *Martha's Vineyard Reservation*

Our last report recorded the continued existence of the last heath hen on the farm of James Green in West Tisbury, and the last authentic report of it being seen on September 14, 1930.

Within the period of the present report it was seen by Warden Karl Eckert near the Green farm on Dec. 22, 1930, and it was reported as having been seen on Feb. 13, 1931 at the farm by Edward T. Vincent, Manuel Swartz and Leon Estabrook of Edgartown.

The land which was formerly known as the heath hen reservation has been turned over to the Division to Forestry and is posted against all hunting, to remain thus closed until there is absolute assurance that no heath hen remains alive. Special care is taken to guard against forest fires on this area.

Under the auspices of the Fish and Game Division Dr. Alfred O. Gross made the usual spring observations, in company with Thornton W. Burgess. This included the making of moving pictures of the bird and trapping, banding and releasing it. The report of Dr. Gross follows.

"The last heath hen, the sole survivor of his race since December 8, 1928, a bird which is free to roam the scrub-oak plains of Martha's Vineyard Island, Massachusetts, was trapped and marked with two numbered metal bands on April 1, 1931. As soon as the bird was banded and photographed he was again liberated in his favorite retreat among the scrub oaks, apparently none the worse for his experience.

"The annual census, which has now come to be observations of a

single bird, was made under the auspices of the Massachusetts Division of Fisheries and Game during the week of March 30-April 4.

"In the past the heath hens came each spring to the clearings or open grasslands to go through their weird courtship performances. The last bird, true to the traditions of his race, visits the meadow on the farm of James Green, near West Tisbury, which is his ancestral booming field. Because of this curious instinctive trait it is possible to entice this bird to within a few feet of a wooden blind set up in the midst of the field where it comes with unfailing regularity. The blind enabled the observers to trap the bird as well as to study and photograph it at close range.

"The trap used was a simple iron frame covered over with fish seine netting, the latter being used instead of wire to prevent injury to the bird. The trap was released by a string running from the trigger stick to the blind. The day on which the heath hen was trapped there was a steady downpour of rain. The bird came out of the scrub oaks at 6:45 A.M. and walked steadily but cautiously toward the vicinity of the blind to secure the grain which had been placed there to lure it to close range. The bird exhibited no fear of the blind and at first paid not the least attention to the traps, entirely new objects in the environment of its feeding place. The bird ate greedily of the grain, adjusted its plumage to shed the rain and then settled down in the grass stubble with its head facing toward the driving "Northeaster". In about a half hour it sauntered towards the trap, and after a brief inspection entered to pick at the ear of corn used as bait. It was an exciting moment inside of the blind; the least false move would mean failure. Promptly at a pre-arranged signal the trap was released and the last heath hen was made a temporary prisoner. Though the heavily overcast sky and heavy downpour of rain made conditions unfavorable for photography, moving pictures and stills were made of the entire procedure.

"Two bands were used. An aluminum band, number 407880, was placed on the tarsus of the left leg and a copper band, number A-634024, was fastened to the right tarsus. It is desirable to have both legs marked in the event the bird is killed by some predatory animal or hawk and the two legs torn apart and separated. In the future, after the death of the bird, if either leg is found the remains can be readily identified. The bands will also serve as a definite identification as long as the bird continues to live. The banding operations did not seem to harm the bird in the least. It returned to the blind the very next day, giving the observers an opportunity to secure additional moving pictures.

"The last heath hen is a splendid, well groomed male. It is heavy, plump and exceedingly strong and resistant. An examination of the bird revealed no trace of disease or external parasites which were common among its last companions examined by the author in past years. There is no way of ascertaining the age of this bird, but since the last record of any young was in 1924, it is probable this individual is at least seven years old, and perhaps much older. Birds are known to live long lives, and it is possible for the heath hen to live on for a considerable time. The last two passenger pigeons which were in captivity at the Cincinnati Zoological Society, Cincinnati, Ohio, were more than twenty years old at the time of their death. How many years the last heath hen will prolong the life of its race cannot be predicted, but it is truly remarkable that this lone bird has been able to escape all of the vicissitudes of the elements and the constant danger of predators and disease. This fact is further emphasized when we review the recent history of the decline of these birds and note how rapidly the flock was reduced to one bird. In April 1924 the annual census accounted for 54 birds, but in spite of the combined efforts of the State, the Federation of the Bird Clubs of New England and other organizations the birds



decreased rapidly. In 1927 there were thirteen birds, only two of which were females. In the autumn of that year seven birds made their appearance. This flock appeared regularly on the open meadow of the Green farm, but during the course of the winter it dwindled one by one until only three males remained at the time of the annual census in April, 1928. At the approach of summer the birds dispersed, as usual, to the dense scrub oaks, where in the course of their wanderings one more bird was lost, and only two heath hens returned to the Green farm in the autumn. The two birds were reported almost daily until December 8, 1928. Since that date only one bird has been seen, which we believe is the last of his race.

In recent years many earnest requests have been received advocating that those in charge of the last heath hen secure a female prairie chicken or some other grouse (as the ruffed grouse), as a mate for this last lone bird, either for practical or purely sentimental reasons. There are several reasons why this has not been done. In the past many attempts were made to introduce the prairie chicken, the close relative of the heath hen, to Pennsylvania and the plains of New Jersey, Long Island and Massachusetts, including Martha's Vineyard. Although these introductions were made in large numbers and with great care, every one of them resulted in failure. Likewise introductions of the heath hen, when these birds were abundant on Martha's Vineyard, made to Long Island and the mainland of Massachusetts, never proved a success. All attempts to rear the birds in captivity failed. It is apparent that pinnated grouse (heath hen and prairie chicken) do not lend themselves to such methods of conservation and are very sensitive to any change in their environment. They are not adaptable and are totally unlike the hardy pheasant which can be readily transplanted from one part of the country to another. But grant that an introduction of prairie chickens to Martha's Vineyard would be successful, there would be only the remotest chance that the heath hen would mate successfully with the prairie chickens. One reason of the failure of the heath hen to raise young since 1924, when there were still a number of females present with the males, was the fact that excessive interbreeding had brought about declining sexual vigor and sterility. This was further evidenced by the examination of several male birds in which the sexual glands were degenerated and therefore there is reason to believe that our last heath hen is sterile. As far as the many suggestions we have received for mating the heath hen with a female pheasant or with a ruffed grouse, they may be dismissed as ridiculous as such a cross is not possible.

Furthermore, a comparative study of the heath hen and prairie chicken from the standpoint of their history, distribution, plumage variation as well as a detailed comparison of their life history, their courtship and behavior, has convinced me that the heath hen and the prairie chicken are the same species and that they differ only as subspecies. The birds are what ornithologists call geographical races. In prehistoric times the heath hen and the prairie chicken were present in an uninterrupted distribution from the Atlantic seaboard to the plains east of the Rockies, but subsequent isolation produced certain differences in the eastern and western representatives, such as relative amount of pigmentation in the feathers, number and shape of the pinnate feathers, etc. These differences, however, are so minor and so variable that Mr. William Brewster was not justified in describing them as distinct species, which he did in 1885. This opinion, advocated in my report on the heath hen in 1928, has now been accepted by the American Ornithologist's Union and ornithologists in general.

Therefore, the bird on Martha's Vineyard, although the last heath hen, is not the last of its species, which is today abundantly represented in many states of the middle west in the form of the prairie



chicken. Although this interpretation may take away much of the glamor and romance which the heath hen has received, nevertheless, the last bird on Martha's Vineyard has fired our imagination and it has served to focus public attention on the necessity of taking immediate positive steps for the conservation of our wild life. If this bird serves as a warning of what may happen to other game birds, the thousands of dollars expended by the State, various organizations and individuals will not have been spent in vain."

The heath hen left the farm of James Green on May 9, and has not been seen there since. The latter part of May it was seen at close range at two different times on the land which was formerly the heath hen reservation, by Mr. L. B. Sanderson, Forest Supervisor. No one has reported seeing the heath hen since that time.

### *Penikese Island Sanctuary*

Improvements were made in the caretaker's house and the fences and yards put in condition. The boat Cora was equipped with new planking from keel to waterline, the cabin recanvassed, a new engine installed, and the entire boat painted.

Through December and to the middle of February there were from 50 to 60 black ducks in the ponds daily, with more in times of storm or blow; through the rest of February, from 30 to 40; to the middle of March, 25 to 50; and thereafter very few until the week of August 16 when 6 wild black ducks were observed in the upper pond, from which time only a few were seen each day until, on October 17, there were 30 present. After that time there were only a few each day.

Feed was placed out for the ducks and all wild birds every day, and after the ice formed, a good-sized area was opened each morning by the caretaker to provide drinking water for all wild birds. It is noticeable that when the ponds are frozen a large number of wild birds gather, for no one else in the vicinity provides open water.

There were 25 decoy ducks and 6 geese when this report opened Dec. 1, 1930, which had been reduced to 20 ducks and 6 geese by the end of the year. As not a single flock of geese came within hearing distance of the island during the year, no decoys were put out.

The work of banding ducks in connection with the work of the U. S. Bureau of Biological Survey was continued. There was only one return—banded Dec. 31, 1930 and killed Jan. 24 following at Hemlock Beach, Long Island, N. Y.

Specimens of the less common ducks were noted at or near the island—including mallards, a pair of shoveller ducks, and a few whistlers. There were also observed a flock of 24 dowitchers and a few yellow legs; quite a number of winter yellow legs and small shore birds; a pair of blue herons; a woodcock, and a blue heron. Quite a number of wild pigeons were observed. While a few have been seen now and then in other years, there have never been so many seen at one time.

Common and roseate terns arrived on April 30 and herring gulls May 10. By the week of May 3 the terns were mating and they laid very satisfactorily—seemingly in greater numbers than ever before and over a wider range. All conditions were favorable and they hatched well, few dead young being observed. By the week of July 12 most of the young were flying, and the following week they started to leave and continued to do so until by the end of the month all were gone.

The usual banding of terns was done in July by L. B. Fletcher, Dr. W. M. Tyler, H. Endicott all of Boston and Albert Fletcher of Washington, D. C., assisted by the caretaker.

Cottontail rabbits were in excellent condition at the beginning of the year, but scarce. The end of December, 1930 and in early January 74 rabbits from the mainland were released to improve the stock. Good numbers of young were seen throughout the breeding period and they

thrived on the unusually abundant natural feed provided by the wet weather. Eighty-three rabbits were trapped and shipped to the mainland (81 for liberation and 2 for study).

The quail, as recorded last year, had apparently all left the island, but early in January one (a banded female) was trapped, wing-clipped and released. During the spring fifty each of bayberry and blueberry bushes were set out for quail cover and food.

Quail from the game farms were liberated on the island, 12 adult on April 18 and 25 young September 30. They were frequently seen thereafter, apparently in excellent condition.

Hawks (several of which were killed) and crows were on the island in moderate numbers, but did little damage.

Over fifty people were warned to stay off the island under penalty of arrest—that is, people who anchor their power boats on the back side of the island and come ashore in row boats. Through the summer and fall months, especially Sundays, an almost constant patrol is maintained to keep off these intruders.

### *Other Sanctuaries*

Because of limited appropriations nothing except incidental development work was done.

**BOXFORD SANCTUARY.**—Trips through the reservation this summer showed that the control measures taken last year against the gypsy moths had been effective. Without this a good portion of the hardwoods would have been killed this year. The heavy rains of June refilled Crooked Pond to overflowing and the numerous water holes carried a supply of water nearly all summer. A good increase in small bird life is noted. The Hemlock Path had been named the Clara Neal Brown Path at the suggestion of Miss Ethel C. Brown as a memorial to her mother, and the Division undertook to place on the path the memorial tablet bought by the Associated Committees for Wild Life Conservation with Miss Brown's donation and some of their own funds. To prevent persons from entering old roadways, invading the breeding areas and creating a fire menace, barways were chained and warning signs located conspicuously. A number of rabbits (captured while damaging a nearby nursery) were liberated in the reservation.

**ISAAC SPRAGUE BIRD SANCTUARY — CARR ISLAND.**—Though the hares and rabbits on this area had increased, limited food supply made it necessary to trap and release them in swamps on the mainland. The west end of the island, never properly posted, was equipped with a large wooden sign bought with the fifty-dollar donation of 1929 from Mr. Isaac Sprague, and the older signs repainted and relettered. With the balance, twenty fruit-bearing trees were bought from the nursery of Harland P. Kelsey of East Boxford, who donated an additional twenty trees. It is of interest that one of the trees on the island has been identified by Prof. John G. Jack of the Arnold Arboretum as a European chestnut, the only one known this side of Washington, D. C. A portion of the small crop of nuts borne this year was given to the Arboretum for planting.

**EDWARD HOWE FORBUSH WILD LIFE RESERVATION, HANCOCK.**—With the exception of interesting the nearby inhabitants to clear up waste wood and trash, no improvements were made. A bronze tablet to Edward Howe Forbush (bought with contributions for the purpose made to the Federation of the Bird Clubs of New England, Inc.) was by them placed on a white quartz rock from the main reservation, re-located on an adjoining section owned by the Federation.

**WATATIC MOUNTAIN WILD LIFE RESERVATION, ASHBY AND ASHBURNHAM.**—Little improvement has been made in this heavily wooded area for the purpose of attracting wild creatures. Considerable damage is apparent on the new growth of trees by hedgehogs, in which there is a marked increase. Rabbits likewise have substantially increased near the



base of the mountain. The cutting of firewood on adjoining property between the reservation and the Ringe Road will undoubtedly decrease the water supply of the wild life in the reservation and nearby areas. In summer there is no water supply whatever on the reservation.

MINNS WILD LIFE SANCTUARY (LITTLE WACHUSETT MOUNTAIN), PRINCETON. — Chains were placed at the old woods roads to exclude the public (it being the wish of the donors to keep this area strictly as a sanctuary) and warning signs renewed. Sections near white pine groves were cleared of wild current and gooseberry bushes (host of the white pine blister rust spores). Fire hose was provided to bring water from the spring on the hillside to a tank near the road where it is held for fire purposes. Miss Lois Fay has made small ponds to hold this water back both for fire purposes and water supply for the wild creatures. Wild life, especially small birds and rabbits, is increasing.

HENRY CABOT LODGE BIRD SANCTUARY, (EGG ROCK). — This solid ledge of rocks can be improved but little over its present condition unless structures could be built adapted for holding fresh rainwater. Gulls and terns use it as a resting place, but its steep sides and lack of soil do not make it attractive for land birds.

RAM ISLAND, MATTAPOISETT. — This island stands as in past years, a nesting place for such migratory birds as drop in from time to time, principally gulls and terns.

KNIGHT WILD LIFE RESERVATION (MILK ISLAND). — This small island is a roost for gulls, terns and some of the shore-frequenting birds. A small freshwater pond still attracts a few black ducks. Little can be done with this low-lying area, open to every gale, except to hold it as a resting place for the above-named birds.

#### *Public Fishing and Hunting Grounds*

The Legislature, by the enactment of Chapter 436 of the Acts of 1931, extended the authority heretofore vested in the Division for the establishment of public fishing grounds by providing that the lands adjacent to brooks, as well as the fishing rights, might be obtained for public fishing grounds; and further provided that the Division may acquire land for public hunting grounds by gift or lease, but did not provide authority for the purchase of lands for this purpose.

Chapter 460 provided an appropriation of \$25,000 to carry on this work, and attention was first directed toward the establishment of public fishing grounds. Options of rights along the Westfield River had already been secured, and therefore the three branches of this river were selected as the location for beginning this important work.

After a careful investigation of similar work in other States a plan was adopted calling for the leasing, for a five-year period with an option of purchase at the end of that time, of a ten-foot strip on either side of the stream. A flat annual rate of \$20 per mile was adopted, payable in advance, and in the event that the option of purchase is taken up before its expiration, the owner to receive a flat rate of \$200 per mile.

As previously stated, William L. Osterhout of Orange was appointed Field Agent as of August 20 to acquire lands under the above act. After forms of agreement and lease had been drawn and approved by the Attorney General, field work started. To date there are twenty miles of the East Branch of the Westfield River actually under agreement to lease; five miles of the Middle Branch; and a mile and a half of the West Branch. Though as yet not every owner has signed, they are beginning to fall into line and absolute control in the near future looks possible.

The plan has been approved by the Westfield River Parkway Association, which is composed of the land owners along the three branches of the Westfield River, and the land owners as a whole have been very glad to cooperate. Many of them have been particularly interested in the protection to be afforded, and the idea of the fishermen staying on the ten-foot strip along the river. The owners have been more than willing to give parking space and a right of way to the river through their prop-



erties. The agent has arranged for a parking space and a right of way at approximately every half-mile along the East Branch and the Middle Branch, giving the fishermen a goodly number of approaches. These rights of way are strips of land five feet wide, leading from the parking spaces to the river.

The establishment of public fishing and hunting grounds has aroused more interest among the sportsmen of the State than any plan which has been initiated in recent years, and all wait with interest the outcome of this new experiment in this State.

## INLAND FISHERIES

### FIELD OBSERVATIONS

(Additional details concerning the individual species will be found under Propagation of Fish and Game, and Fish Distribution).

The trout fishing season opened with pleasant weather throughout the State. While there was the usual comment of unfavorable conditions in various localities due to the unusually high water of spring, in no place did the run-off assume flood proportions. The snowfall of the past winter melted away gradually, making conditions more favorable than would ordinarily be expected after the two years of drouth through which we have passed. But as the season advanced the effect of the two previous dry seasons was evident, and there is little doubt but what the trout suffered severely. A great many large trout were taken. These probably had remained in the deeper waters, as there had been no sign of trout running the streams to get to their spawning beds in the years 1929 and 1930. This fact reduced the wild stock, and it will take several years to get back to what might be called normal.

Brown and rainbow trout fishing throughout the range of these species (which is principally the Deerfield River System and the Westfield River System for both brown and rainbow, and the Quaboag River from Palmer to Warren for rainbow) has shown a noticeable change for the better. This is particularly the case in the East Branch of the Westfield River. Seemingly the recent flood at Becket had its effect upon all branches of the Westfield River System, for the fish were apparently swept down stream to some extent, and as they returned up stream again they followed the three branches, with a marked increase in brown trout in the East Branch. While some of the increase in rainbows there may be attributed to the flood, it is probable that the showing made by these fish is due, in the main, to increased stocking.

Horned pout run about the same from year to year, but, due to protection, larger fish are taken although in some ponds where bass showed up well this year there seems to be a falling off in the number of pout taken.

White perch were taken in good numbers in many ponds, particularly those types of pond that have proven adapted to this species. It was also noticed, as in the case of the horned pout, that where bass were taken plentifully there was a falling off in white perch fishing.

Pickereel fishing, for the most part, was about the same as last year, but continues to show the effects of a ten-months open season and it would be fair to assume that this sport is bound to suffer a further setback from year to year with the heavy drain placed upon it.

Yellow perch continue to appear in their usual numbers and are highly prized for their eating qualities.

Crappie have begun to show up in some ponds. They are of good size and probably will become more popular when fishermen are better acquainted with them.

The Connecticut River continues to have the most diversified fishing of any of our waters, and the numbers of fishermen on these waters increases from year to year with the chance of taking bass, pout, sturgeon, pickerel, perch, pike perch, muskallonge and others of the less popular species of fish.

## PONDS

Pursuant to a petition under Chapter 453, Acts of 1923 the Department of Public Works made a special report to the Legislature (House 353), on the necessity of laying out a public right of way to Dunham's Pond, Carver. This resulted in the enactment of Chapter 306, directing the county commissioners of Plymouth County to lay out such a right of way.

*Great Ponds Stocked and Closed*

On or soon after December 1, 1930, the beginning of the period of this report, the following-named ponds were stocked under Section 40, Chapter 131, General Laws, and regulations (form 1) were applied, to be in force for the periods named below. These regulations prohibited all fishing in the ponds from November 1 to May 30, and in all tributary streams except between April 15 and July 31. Fishing was permitted only with a hand line and single hook, or with a single hook and line attached to a rod or pole held in the hand:

Oldham Pond, Pembroke and Hanson—From Dec. 1, 1930 to Nov. 1, 1933.

Lake Pearl (also called Whittings Pond, Wrentham—From Dec. 1, 1930 to Nov. 1, 1933.

Nippenicket Lake, Bridgewater and Raynham—From Jan. 1, 1931 to Nov. 1, 1933.

Massapoag Lake, Sharon—From Jan. 1, 1931 to Nov. 1, 1933.

Also, under the above act Scaddings Pond (Sabbatia Lake) in the city of Taunton was stocked and regulations (Form 2) applied to be in force from January 1, 1931 to November 1, 1933. These regulations permitted fishing with not more than two hooks and lines (a plug, spinner or artificial bait rigged with triple or gang hook to be considered as one hook), subject to all laws relative to the open season on taking fish.

In the course of the year a special review was made of the Division's practices in the regulation of fishing in ponds stocked under the above-mentioned statute. Over a long period of time the regulations applied to ponds stocked and regulated under Section 28, Chapter 130, General Laws (or under the corresponding law in the new revision—Section 40, Chapter 131, General Laws) had (by Form 1) regulated fishing for a period of three years—closing the pond to winter fishing, and in addition restricting to single hook and hand line, the gear which might lawfully be used. Another set of regulations (Form 2) which were applied in a few cases, did not close the pond to winter fishing, but simply prescribed the use of certain gear for a three-year period.

The number of ponds in which the fishing was regulated under the above statute was small as compared to the total number of ponds in Massachusetts, and it was an easy matter for a well-intentioned fisherman to violate the law, particularly in the use of gear. To simplify matters, a new policy was adopted, whereby the only restrictions would be those relating to winter fishing,—which is the regulation of most benefit to the fisheries.

In order to put the plan into effect, all existing regulations (Form 1) on ponds under the above statute were revoked as of May 30. All existing regulations (Form 2) were revoked as of June 1.

The ponds on which the regulations had been revoked as above fell into four groups—(1) those on which the three-year period of regulation (under Form 1) would expire Nov. 1, 1931; (2) those on which the regulations (under Form 1) would expire Nov. 1, 1932; (3) those on which the regulations (under Form 1) would expire Nov. 1, 1933; and (4) those ponds on which (under Form 2) the type of gear to be used was regulated, but not closed to winter fishing.

There was no occasion to apply the revised regulations (which merely closed the ponds to winter fishing) to the first group, since the three-year period expired before the next winter season.



Concerning the second and third groups, action was taken by the Director closing the ponds and their tributaries to all fishing for the unexpired time.

Concerning the fourth group no action was necessary, since the prohibition of winter fishing had not been a feature of the original regulations.

Subsequently applications were received for the stocking and regulation of Long Pond, Littleton; Morse's Pond, Wellesley and Natick; Congamond Lakes, Southwick; and Quabbin Lake (also called East Pond and Clifford Pond), Greenwich.

The list of stocked and closed ponds, and the regulations relating thereto, now stands, therefore, as follows:

REGULATIONS — "Having caused the following ponds to be stocked with fish in accordance with Section 40, Chapter 131 of the General Laws, I hereby close said ponds and their tributaries to all fishing during the periods listed below. I hereby prescribe a penalty of twenty dollars for each violation of these regulations.

RAYMOND J. KENNEY,  
*Director of Fisheries and Game*"

Body of Water	Town	Regulations are effective for the following periods, both dates inclusive
Snipatuit Pond . . . . .	Rochester	Nov. 1, 1931, to May 29, 1932
Mary's Pond (also called Cary's Pond) . . . . .	Rochester and Marion	Nov. 1, 1931, to May 29, 1932
Snow's Pond . . . . .	Rochester	Nov. 1, 1931, to May 29, 1932
Winnecunnet Lake . . . . .	Norton	Nov. 1, 1931, to May 29, 1932
Forest Lake (also called South Pond, Harris, Welch and Youth's Pond) . . . . .	Methuen	Nov. 1, 1931, to May 29, 1932
Nesseponsett Lake (also called Neeseponsett Lake; Town Pond; part of the lake known as Middle Pond)	Dana and New Salem	Nov. 1, 1931, to May 29, 1932
Fort Pond . . . . .	Littleton	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Bare Hill Pond . . . . .	Harvard	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Wenham Pond . . . . .	Carver	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Indian Head Pond . . . . .	Hanson	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Oldham Pond . . . . .	Pembroke and Hanson	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Lake Pearl (also called Whittings Pond) . . . . .	Wrentham	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Nippenicket Pond . . . . .	Bridgewater and Raynham	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Massapoag Lake . . . . .	Sharon	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933
Long Pond . . . . .	Littleton	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933 Nov. 1, 1933, to May 29, 1934
Morse's Pond . . . . .	Wellesley and Natick	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933 Nov. 1, 1933, to May 29, 1934
Congamond Lakes . . . . .	Southwick	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933 Nov. 1, 1933, to May 29, 1934
Quabbin Lake (also called East Pond and Clifford Pond) . . . . .	Greenwich	Nov. 1, 1931, to May 29, 1932 Nov. 1, 1932, to May 29, 1933 Nov. 1, 1933, to May 29, 1934



*Privately owned or controlled Ponds stocked*

Through cooperation with the land owners the Division secured control of the fishing rights in 8 private ponds.

*Breeding Areas in Great Ponds*

No petitions were received for the closing of breeding areas in great ponds. Such closed areas exist in portions of the following bodies of water: Webster Lake, Webster, until Jan. 1, 1932; Lake George, Wales until Dec. 1, 1932; and Bare Hill Pond, Harvard until Dec. 1, 1933.

**POLLUTION**

A number of complaints of pollution in streams was reported to the Division. They were investigated and handled in the usual manner. No serious problems arose and the offenders indicated their willingness to correct conditions wherever possible.

**PROPAGATION OF FISH AND GAME****FISH HATCHERIES AND GAME FARMS — GENERAL**

At several of the fish hatcheries steps are being taken to acquire certain tracts of land, though the transactions have not been completed at the close of this report. It is the Division's policy to acquire such of the lands held under lease as are needed for immediate use, and in the course of the next few years to develop present holdings for a maximum production, rather than to continue to extend its holdings.

A determined effort has been made to increase the efficiency of the fish hatcheries and game farms with a view to securing maximum production at a minimum cost. This policy will be pursued until all of the present plants are producing to their full capacity and the overhead and operating costs have been reduced to a sound business basis, including the cost of distributing the stock. The practical difficulties of propagation work have been mastered by the superintendents in charge of the various plants, and future efforts will be directed largely toward cutting the cost of producing and distributing the output. Despite this policy, the hatchery and game farm buildings and equipment have been kept in reasonably good repair and wherever possible improved equipment has been provided. The residential property has also been kept in good repair and modern conveniences have been installed where they have heretofore been lacking.

The first legislation of the session was the appropriation of money for the employment, by various departments, of additional persons as a measure of relief during the unemployment emergency. The \$8,700 assigned to this Division was apportioned, as equally as appeared feasible, among the various game farms and fish hatcheries, with instructions to spend the greater part for labor, purchasing materials only when absolutely necessary to keep the men busy. The superintendents secured the men from the local unemployment bureau, giving preference to married men with families. Approximately fifty men were employed at a rate of \$3.50 per day, and for periods of time ranging from two weeks to two months. The work done consisted mainly of cutting brush, grading, and other rough work about the stations, but in some instances where carpenters or painters were sent by the unemployment committee, materials were purchased in order to get the maximum results from the labor of these craftsmen.

Information having been furnished the Secretary of Agriculture that certain species of fish-eating birds protected by the Migratory Bird Treaty Act and regulations thereunder have become, under extraordinary conditions, seriously injurious to and destructive of fishes at fish hatcheries, the Secretary promulgated an order on August 21, giving the owner, superintendent or employees of a public or fish hatchery the right to shoot or trap certain birds which are on the grounds of the fish hatchery and

likely to destroy the fish being propagated. The order requires the issuance of permits for this purpose and the Bureau of Biological Survey has arranged with the Division for the issuance of such permits to owners or superintendents of fish hatcheries in Massachusetts. The order applies to the following: grebes, loons, gulls and terns, mergansers, bitterns, great blue herons, little blue herons, green herons and black crowned night herons.

The development of artificial methods for the propagation of quail made necessary a change in policy at the four game farms where heretofore the activities have been almost entirely directed toward the propagation of pheasants. Lack of equipment to take care of the expansion of the quail work made it necessary to restrict pheasant production. The brood stocks of pheasants have been maintained at about the same number at each farm for several years. At the beginning of the season each superintendent was instructed to collect and set only enough eggs to produce 3,500 young pheasants with the exception of the Ayer Game Farm, which was to produce 1,500. Because of an unusually good season the pheasant production exceeded the quotas at three of the game farms. After laying plans to produce their quotas of pheasants the superintendents devoted the rest of their resources to the production of quail, with the gratifying results indicated in the reports of the individual farms.

*Amherst Fish Hatchery — Louis Horst, Supt.*

**NEW CONSTRUCTION.** — The \$300 assigned to this station for unemployment relief was used for road building.

On the Hubbard tract two special fry ponds were built. A 75-foot dam 18 feet wide was constructed with a cement flume and a gravel fill to impound the water and warm it up to the right temperature for brown trout culture, making a pond 75 x 120 feet. Two hundred feet of new, wooden-sided pools were constructed below the fry pools. An 80-foot four-inch pipe line was installed from the dam to the 200 feet of new ponds. Considerable grading was done around dam and ponds.

On the original hatchery grounds six cement dams were constructed on the back brook to replace worn-out wooden ones. Seven cement dams and one retaining wall were built in Section No. 6. Three dams and one retaining wall were built in Section No. 7. Five dams and two retaining walls were built in the upper Five Pond section. Repair work was done on some of the ponds and the sides rebuilt.

On the Graves tract stumps were removed; a road built through the tract, and also a road leading to the hatch house; 250 feet of wooden-sided rearing pools constructed. For the first time, a power shovel was used with excellent success for excavating the land of two sections of ponds.

A combination garage, meat house and storage house and work room was erected, 28 x 38 feet and one and one-half stories high. Grading was done around the building to some extent.

Considerable brush cutting was done in the red pine stand and on the Hubbard tract. 1,500 white spruce, red and Scotch pine were planted.

**NEW EQUIPMENT.** — The Ford truck was replaced by a Ford Model AA, 1½ ton truck. A Spencer microscope with condenser was added to the equipment.

**BROOK TROUT.** — No brood stock of brook trout is held at this station.

The 65,000 brook trout fingerlings on hand at the beginning of the year made a remarkable growth during the winter months, and were reclassified as yearlings. 3,330 were lost or unaccounted for, 50,600 were distributed to open waters, and 11,070 to club rearing pools.

In April 120,400 brook trout fry averaging one inch in length were received from the Montague Fish Hatchery. There were losses of 14,400 as fry, and 106,000 were reared and reclassified as fingerlings. Throughout the rearing period to date they have made very satisfactory growth.



During the summer and fall an attack of gill trouble and gyrodactylus broke out, but the fish were successfully treated by the method outlined in last year's report. The trout were fed from April 21 to July 1 on pork livers, from July 1 to August 1 half liver and half melts, and then melts and heart. To the 106,000 reclassified fingerlings were added 15,200 fingerlings from the U. S. Bureau of Fisheries Station at Nashua, N. H. (for restocking the Sutton Fish Rearing Station later), making a total of 121,200 fish. Of these 14,000 were transferred in November to the Sutton Fish Rearing Station, 2,000 were distributed to a club for further rearing and later liberation, 23,200 lost, and 82,000 remain on hand November 30.

**BROWN TROUT.**—A brood stock of brown trout is maintained at this station, and this is the second year that all brown trout eggs collected or received have been hatched here.

The year opened with 900 adult brown trout on hand, 290 of which were distributed to open waters, 31 distributed for display, 50 lost, and 529 remain on hand November 30.

Of the 7,800 fish (1929-hatched) on hand at the beginning of the year 935 were lost, 15 distributed for display, and 6,850 to open waters.

Of the 40,000 fish (1930-hatched) on hand at the beginning of the year 6,000 were lost early in the year, 30 distributed for display and 33,970 reared and reclassified as yearlings. Of these 8,175 were lost or unaccounted for, 10 distributed for display, 24,385 to public waters, and 1,400 to a club for further rearing and later distribution. Some of the yearling fish were tagged before being released. (For details see Biological Section.)

During the latter part of November, 1930, there had been 360,000 brown trout eggs stripped from brood stock in the station. In addition, 100,000 brown trout eggs were received from the U. S. Fisheries Bureau Station at Bozeman, Mont., in exchange for brook trout eggs sent to their Nashua, N. H., station from the Sandwich Fish Hatchery. From a commercial dealer 25,000 brown trout eggs were purchased and planted in open waters.

Of the 460,000 eggs on hand 3,000 were distributed for study, 99,000 lost or unaccounted for, and 358,000 fry hatched. The same feeding method was followed as outlined in the last report. Of these fry 160,000 were lost or unaccounted for, 300 distributed for study and 197,700 reclassified as fingerlings.

Of the fingerlings 10,000 were sent to the Sutton Fish Rearing Station in November, 3,000 distributed to a club for further rearing and later liberation, 69,000 to open waters, 60,700 lost, and 55,000 remain on hand November 30.

#### *East Sandwich Fish Rearing Station—Alfred C. Fish, Supt.*

**NEW CONSTRUCTION.**—The concrete pools back of the workshop were repaired.

Ends and flumes were put in eleven dirt pools back of the Grange Hall.

Three wooden pools 7 feet square were constructed in the hatch house for starting fry.

A tide gate was installed at the railroad to prevent the hatchery from being flooded at abnormally high tides. This has occurred nearly every winter, although last winter was the worst in recent years. The week of March 7 there were one day at least eighteen inches of water over several of the pools, with the result that a considerable number of fish escaped.

**NEW EQUIPMENT.**—A two-horsepower motor was installed in the grinding room to replace the gasolene engine which had been in use several years.

**BROOK TROUT.**—The year opened with 99 of the 1929-hatched fish on hand. Of these 2 were lost, and 97, together with 107 fish collected from the filter box back of the hatching house making a total of 204, dis-



tributed to open waters. The 107 fish had been hatched two years previously from wild trout eggs.

Of the 32,950 fingerlings on hand at the beginning of the year, 1,300 were lost or unaccounted for and 31,650 reared and reclassified as yearlings. Of these 10,375 were lost, escaped, unaccounted for, or destroyed because of the recurrence of furunculosis in certain of the pools, and 21,275 distributed to public waters.

For the work of the season 80,560 fry, fed fifty-six days, were received in late March and early April from the Sandwich Fish Hatchery. They were fed until May 1 on pork liver, from May 1 to July 1 50% liver and 50% melts, from July 1 to August 26 wholly on melts, and then 50% melts and pork heart. Some of these fish were placed in the three new wooden pools in the hatch house, where they were fed pork liver by automatic feeders, and made an extraordinary growth until furunculosis developed. By the middle of May the fish averaged three inches in length, and when removed from the pools on June 20 a large percentage averaged four inches. The experiment could not be continued after that date as the water temperature in the pools was too high. Of the 80,560 fry 2,650 were lost and 77,910 reclassified as fingerlings, 30,402 of these were lost or unaccounted for and 47,508 remain on hand November 30.

CHINOOK SALMON. — For the work of the season 50,000 Chinook salmon eggs were received in exchange for brook trout eggs sent to the California Fish and Game Commission in 1928. 45,700 fry hatched, of which 1,475 were lost and 44,225 reared and reclassified as fingerlings, 1,225 were lost or unaccounted for and 43,000 distributed to open waters.

SEBAGO SALMON. — Of the 2,000 landlocked salmon fry received last year from the United States Bureau of Fisheries, 1,375 were reared and in April planted in open waters.

#### *Montague Fish Hatchery — Ralph Bitzer, Supt.*

NEW CONSTRUCTION. — The \$400 assigned to this station for unemployment relief was used for road making, cutting underbrush, thinning the larger trees (including the cutting of about 25 cords of wood), and reforesting the areas thus cleared.

A cement head box was installed on the pipe line carrying water from the back stream down to ponds on the newly developed area. This makes it possible to divert water from the back brook to pools supplied by the main brook line. By this arrangement all the ponds can be kept in use while the ponds in the main brook can be drawn for cleaning.

Below the developed area an 18-foot cement culvert was built, as well as two cement dams three and four feet respectively, and 3½ feet high. A power shovel was engaged for digging the ponds. The ponds measure approximately 180 x 75 feet and are 3 feet deep. In connection with building these ponds an 18-foot roadway was made and continued down around the end of the new ponds and over the culvert, there ending for the present.

The old wooden dams on the main stream were replaced with concrete, one below the culverts and used for holding the large exhibition fish, and the other for damming the water that it might be carried below through pipes.

Twenty-one old wooden dams above the hatch house were replaced with concrete, leaving but a few remaining wooden dams. These dams were all turfed in.

The entire hatchery road was gravelled, as well as the roadway into the residence.

A concrete garage foundation 20 x 24 feet was completed, grading done around the outer sides, and equipped with drainage tiles.

7,185 trees were set out of Norway spruce, white and red pine, together with 500 arbor vitae.

NEW EQUIPMENT. — The Ford truck was replaced by a new Ford Model AA, 1½ ton truck.

BROOK TROUT. — No brood stock of brook trout is carried at this station.

Of the 400 adult trout retained on hand for exhibits and displays, 65 were lost or unaccounted for, 18 distributed for display, and 317 are on hand November 30.

After the ponds were cleaned 1,000 1929-hatched fish were found to be on hand which had not been recorded in the previous report. These were distributed to open waters early in January.

The year opened with 120,200 fingerlings on hand, 50 of which were lost and 120,150 reared and reclassified as yearlings. 9,489 were lost or unaccounted for, 6 distributed for display, 99,055 to open waters, and 11,600 to club pools.

On December 10, 1930, 440,000 eyed brook trout eggs were received from the Sandwich Hatchery, the resulting fry to be used at both the Montague and the Amherst Fish Hatcheries. 400,000 fry hatched, of which 40,000 were lost, 120,400 averaging one inch transferred in April to the Amherst Fish Hatchery and 239,600 reared and reclassified as fingerlings. The usual care was taken in feeding the fish in the troughs and the first of March they were transferred to the outside pools. The fingerlings were fed pork liver until well into May, when melts were gradually added and finally used entirely.

Of the 239,600 fingerlings 45,000 were lost or unaccounted for, 17,000 transferred to the Sutton Fish Rearing Station late in October and November to be carried through the winter for next spring's yearling distribution, 19,000 distributed to club rearing pools, 52,000 to local brooks, and 106,600 remain on hand November 30.

RAINBOW TROUT. — A brood stock of rainbow trout is maintained at this station. The year opened with 3,200 yearlings on hand of which 600 were lost or unaccounted for, 2,600 reclassified as adults and added to the 1,709 adults on hand the first of the year, making a total of 4,309. Of these 959 were lost, 6 distributed for display, 2,400 distributed to open waters and 944 are on hand November 30.

There are 2,500 fingerlings on hand at the beginning of the year, the product of eggs collected at this station. 900 were lost and 1,600 were reclassified as yearlings which are on hand November 30. Six thousand fingerlings were on hand which had been reared from eggs received from the U. S. Bureau of Fisheries. There were 2,500 lost and 3,500 reclassified as yearlings which are on hand November 30.

For the work of the season 50,000 eggs were received on January 2 from the U. S. Bureau of Fisheries station at White Sulphur Springs, in exchange for which 50,000 brook trout eggs were sent from the Sandwich Fish Hatchery to the U. S. Bureau of Fisheries station at Nashua, N. H. During the last part of March and the first part of April 50,000 eggs were collected from the station brood stock. Both lots of eggs hatched very well, giving 74,000 fry (40,000 from the federal hatchery eggs and 34,000 from station stock). The fry were fed the same food as the brook trout, that is, first on liver, then on liver and melts and finally on melts only. 20,000 were lost or unaccounted for and 54,000 reared and reclassified as fingerlings. 6,000 fingerlings were lost and 48,000 remain on hand November 30.

At the close of the year there are on hand 48,000 fingerlings, 5,100 yearlings and 944 adults.

*Palmer Fish Hatchery — William F. Monroe, Supt.*

NEW CONSTRUCTION. — The \$300 assigned to this station for unemployment relief was spent wholly for labor in brushing along the brook opposite the No. 1 bass pond, down stream to the end of the hatchery boundary.



Continuing the program of replacing wooden overflows with concrete, six pool overflows were so replaced. In nine pools separate drains were made from four-inch second-hand pipe, which have been a great improvement, allowing the cleaning of each pool independent of the others.

The program was continued of walling up another 100 feet of the main brook along the bass ponds.

On the old salmon pool location five new wooden 12 x 14 foot pools were built, primarily for fry. These differed from the other pools inasmuch as they are constructed to give a circular flow of water in each pool, which gives an opportunity to use automatic feeders (now a standard means of fry feeding at this station) to advantage.

New wooden walks were built to five raceways of the bass ponds. No. 7 pond has been enlarged and much grading done around the ponds. The island in No. 3 pond was removed to allow for better seining.

Two pools were built back of the single house, partly covered with wire to save the fish from predatory birds.

Stock pond No. 2 for bass was cleaned. There are two such ponds, and they must be cleaned every other year in order to insure clean ponds for the wintering of the adult bass stock.

There were 1,000 white spruce and red pines set out.

**NEW EQUIPMENT.** — A new boat and trailer were purchased, which will be used primarily in getting shiners, small salvage jobs and in the bass work, such as removing beds from the ponds and in screening bass fry.

**BROOK TROUT.** — The year opened with 60,450 brook trout fingerlings on hand, all of which were reclassified as yearlings. 26,034 were lost or unaccounted for, 4,160 distributed to club rearing pools and 30,256 to open waters. There were distributed 87 adults collected from the bass and supply ponds.

For the work of the season 90,000 eggs were received from the Sandwich Fish Hatchery. 10,000 were distributed for exhibition purposes, 1,925 were lost, and 78,075 fry hatched.

Last year's methods of feeding and general handling were continued.

Of the 78,075 fry hatched 2,800 were lost or unaccounted for, 5,000 distributed for exhibition purposes, and 70,275 reared and reclassified as fingerlings. A small outbreak of gyrodactylus was successfully treated, with no losses.

To the 70,275 fingerlings were added 15,000 from the U. S. Bureau of Fisheries station at Nashua, N. H., introduced among the station stock for the purpose of producing large sized fingerlings for restocking the Sutton Fish Hatchery in November. 13,275 fingerlings were lost, 2 distributed for experimental purposes and 71,998 remain on hand November 30.

**SMALL-MOUTH BLACK BASS.** — The season started with 301 adult brood fish. From the bass ponds there were collected and distributed to open waters 174,000 fry and 39,600 fingerlings. In addition 50 fingerlings were distributed for display and 13,500 turned over to the U. S. Bureau of Fisheries (all of which were planted in Massachusetts waters).

The same methods outlined in the last report of rearing these fish and fertilizing the ponds were used. It is only through improved methods that the annual output of bass fingerlings can be increased. Much research work still remains to be done in bass propagation, and many experiments are being carried on, especially by the U. S. Bureau of Fisheries. It is hoped that, by profiting by these studies, our production of fingerlings in a given area of water may be increased.

To the 301 adults on hand at the beginning of the year were added 75 breeders from one of the salvage jobs. 18 adults were distributed for display, 107 were lost and 251 are on hand November 30.

**HORNED POUTS, BLUE GILLS, YELLOW PERCH AND PICKEREL.** — To the



300 horned pout on hand were added 50 from a salvage job. From the No. 1 and No. 2 stock ponds for bass, from the shiner pond and from the bass supply dam were collected and distributed 176 pickerel (115 under 12 inches and 61 over 12 inches); 3,000 horned pout (under 6 inches); 3,183 yellow perch (under 6 inches); and 7,250 blue gills (under 6 inches).

*Sandwich Fish Hatchery — Irving E. Lewis, Supt.*

**NEW CONSTRUCTION.** — The \$300 assigned to this station to be spent for unemployment relief was used for widening or grading roads and ditches and clearing out brush.

The two adult fish pools near the State road that were roughed out with power shovel last year, were completed; one new pool, with natural dirt sides and bottom, constructed near the meat house; and two similar new pools constructed back of the hatchery building. The old wooden pools back of the hatchery building were replaced with one new square pool with board sides. The overflow ditch back of the cement adult fish pools was changed and widened.

- One new well was driven and two cement troughs constructed on property of Mr. Frank Tobey and Mr. Bernard McArdle to provide the water supply for their stock, guaranteed them by us some years ago, when, in extending pools farther down stream, the course of the water was changed. This year, in course of sterilizing the pools to eradicate furunculosis, it was necessary to change the watercourse.

Brush was cleaned out back of the meat house and garage and alongside of the new road.

The sides of the new road were graded, and a portion widened.

**NEW EQUIPMENT.** — No new equipment was added.

**BROOK TROUT.** — The year opened with 69,100 fingerlings on hand, of which 1,900 were lost or unaccounted for and 67,200 reclassified as yearlings. Of these 15,450 were lost or destroyed, on account of disease, 710 distributed for display, 50,040 to open waters, and 1,000 to club rearing pools.

Of the 4,113 yearlings on hand at the beginning of the year 172 were lost or unaccounted for, 3,941 reclassified as adults and added to the 5,334 brood stock on hand at the beginning of the year, making 9,275. Of these 2,300 were distributed to open waters, 56 for exhibition, and 6,919 lost, unaccounted for or destroyed because of the presence of furunculosis (discussed later).

For the work of the year 1,350,000 eggs had been taken from the brood stock at this station late the previous November. Of these 110,000 were lost, 90,000 sent to the Palmer Fish Hatchery, 440,000 to the Montague Fish Hatchery, 150,000 to the U. S. Bureau of Fisheries station at Nashua, N. H. (in exchange for 100,000 brown and 50,000 rainbow trout eggs furnished by the Bureau to the Amherst and Montague stations, respectively). In addition, 60,000 eggs were planted in feeder streams as an experiment, and 500,000 hatched for rearing.

The fry started to hatch about January 1. From February 1 to May 1 they were fed on pork livers three times a day, after which they were fed 25% melts and 75% liver, the latter being gradually reduced until July, when pork melts only were given. At this time the feedings were reduced to two a day, and during August reduced gradually to one feeding a day. Both the automatic and the hand dipper methods of feeding were used.

For the first time at this station the fish became infected with furunculosis, detected early in April in the brood stock. The losses were very heavy and it was decided to destroy all the brood stock. Accordingly, 4,117 adults and 1,157 yearling fish were destroyed on June 24. Sterilization of the pools with copper sulphate and unslacked lime was started immediately but it could not be definitely ascertained at

that time how far the disease had spread. It appeared among the fingerling fish about the end of June, and by July 30 had spread from the pools in the vicinity of the meat house to the cement nursery pools. On October 1 it made its appearance in seven of the eighteen cement pools in front of the hatchery building. The mortality among these fingerling fish affected with furunculosis continued so great that it was decided to distribute the entire production, and this distribution will be started early in the coming year. After the distribution the hatchery pools and buildings will be completely disinfected.

Of the 500,000 fry hatched 85,000 were lost, 80,560 transferred to the East Sandwich Fish Rearing Station, 65,000 distributed to open waters, and 269,440 reclassified as fingerlings. There were 116,172 fingerlings lost or unaccounted for, 62,400 distributed to open waters, and 90,868 remain on hand November 30.

*Sutton Fish Rearing Station — Arthur Merrill, Supt.*

**NEW CONSTRUCTION.** — The \$500 assigned to this station for unemployment relief was spent in part for painting about the hatchery, but used mostly about the Merrill Pond System.

In the way of general repair and improvement much of the older concrete was rebuilt, new outlets built in nine ponds, and four of these ponds (out of use some time as designed for fingerling production only) rebuilt for yearlings. Construction was started on two ponds to be built in the brook channel, where fingerlings were reared in shallow runways. All of the ponds were cleaned, and many deepened by sluicing the bottom material down through the system until it passed down the brook or was deposited on the flat below for filling.

All wooden trough or tank equipment used for fish was painted; shipping stand repaired and painted; new covers made and painted for all concrete water supply tanks, and the open ditch feeding water from the upper water tank to the eight ponds west of the hatch house, was filled and a vitrified pipe line with concreted joints laid to carry this water supply.

A special equipment of gear, including nets, grading racks, pails and tanks was made to meet the increasing demand for this equipment for use when ponds in various parts of the State are drawn off and the fish can be salvaged, or to loan to clubs for their pond work.

The barns were painted, the workshop under the barn enlarged, and the space above converted into can storage and paint room. The interior of the meat room was painted.

Five hundred Scotch pines were set out.

In addition to the operation of the fish rearing station and the Merrill ponds, Superintendent Merrill does much special work in the course of the year where expert advice is required, such as investigation of the suitability of sites for rearing stations, investigating locations where clubs or individuals wish to establish ponds for fish cultural work, and making the plans, giving expert advice when trouble arises among the fish in the club rearing pools, and similar problems. During the year over 400 hours were devoted to approximately 85 such projects.

**NEW EQUIPMENT.** — This included special nets, portable grading tanks for handling pond fish, portable sections for traps to use in drawing off ponds where fish were to be salvaged, and portable building. The Chevrolet truck was replaced with a Ford, Model A truck.

**BROOK TROUT.** — There is no brood stock of brook trout at this station. The year opened with 25,000 fingerlings on hand, all of which were reared and reclassified as yearlings. Of these, 13,180 were lost and 11,820 distributed to open waters. The distribution of these fish was completed in May and the pools were allowed to remain empty.

Early in the year furunculosis again made its appearance in the extreme upper pools of the hatchery, thereby infecting the whole system.



The presence of this disease was attributed to herons feeding on diseased fish below, and perching in the trees over this pool. Since it appeared that freedom from this disease could be obtained in no other way, trout culture was suspended and the season devoted to a general sterilization and renovation of the pools. This work was extended to include such changes and reconstruction as would give greater safety from herons and adapt the ponds to yearlings rather than fingerling fish.

The work of eradicating the disease was undertaken as soon as the last of the trout were shipped so that the pools could be treated with sterilizing agents, which to be in the least effective for destroying bacteria are quickly fatal to organic life.

In the absence of any fish subject to infection to indicate that it was not present; and with no known means of proving that it was not present; and with nothing to prove the efficacy of any treatment,—the longest possible period of complete rest was planned for, with successive treatments of various sterilizing agents to subject any possible infection to their action when exposed in the general cleaning operations, or, if exposed and possibly buried, in the general sluicing of all mud and silt down the ponds until it was discharged below the system. The treatments were timed to be effective in various stages as the mud was sluiced down.

After the first series of treatments the sides and bottoms of the ponds, with special attention to stone and concrete work, were washed most thoroughly with a forest fire pump in a two-day operation by men from the District Forestry unit. This washing was finally repeated with an equipment designed for the purpose, pumping water charged with chlorine.

The first general treatments were with copper sulphate, then with potassium permanganate, the latter for the added purpose of determining from its color the action of the currents as the ponds were filled, and as a test for any variation in diffusion through the ponds.

A color test was also made in using chlorine derived from chlorinated lime, and as both tests showed a very unequal diffusion, with the least strength along the inequalities of the rocky shore lines, where the greatest seemed to be needed, the final treatments were made in greater strength of material, and at the lowest stage of water flow to permit a longer period of penetration before dilution came from the flow of the springs.

In an early experimental treatment, compressed chlorine gas was discharged into the stream and the ponds filled with this treated water. This showed the value of chlorine and the advantages of its use in cost and effectiveness, but also showed the need of apparatus to discharge it under pressure because of the difficulties in combining it with open water when released from the cylinder under such high compression, and then its rate of escape from the water made a question of strength at the end, in filling a series of ponds holding such a large volume of water.

This work resulted in devising the unit for discharging chlorine with a pump, which work was carried on with chlorinated lime, but it is indicated (providing the treatment proves wholly satisfactory), that a portable unit can be used for either chlorinated lime or compressed chlorine gas to treat empty or full ponds at the minimum cost. The work of cleaning ponds was carried on to the extent that there was a general deepening, with almost everywhere a new bottom. The bottoms and sides of these ponds were treated with pulverized unslaked lime, and this treatment was extended to an area about the ponds where any work had been done, or where birds feeding on diseased fish had dropped fecal matter, and with doubled amount about the main centers of infection or where thick shade prevented the sun from reaching the ground freely.



Because of the outbreak of furunculosis at the Sandwich Fish Hatchery, which has always supplied this station with its fingerling stock to be reared for yearling distribution, it was thought inadvisable to bring in stock from that source.

In order that this station might be supplied after October 15 with its quota of fingerlings to rear and carry through the winter for yearling distribution in 1932, arrangements were made with the U. S. Bureau of Fisheries for fingerling fish. Consignments were received at Palmer and at Amherst, and 20,000 at this station which were carried in pools outside the station grounds. Of these 2,000 were distributed to club pools, 500 to open waters, 75 for study purposes, 12,060 lost or unaccounted for, and 5,365 brought to the station proper. To these were added late in October and November 14,000 from the Amherst and 17,000 from the Montague stations, making 36,365. This gave the station its full quota without drawing on the supply at Palmer. 365 were lost and 36,000 remain on hand November 30.

BROWN TROUT.—As an experiment 10,000 brown trout fingerlings (3 to 4 in.) were transferred late in November from the Amherst Fish Hatchery to this station where they are being held for further rearing.

*Ayer Game Farm — Edward E. Backus, Supt.*

NEW CONSTRUCTION.—The \$300 assigned to this station for unemployment relief was spent for labor in clearing land and on new construction in connection with quail work.

Brush and trees on several acres of the flat were cut during the winter. The stumps on the area cut over a year ago were removed with dynamite and tractor, and the whole area, except that part more recently cut over, was plowed, harrowed and sowed to a cover crop. This work when completed will more than double the amount of land available for bird rearing.

The barn was demolished and the lumber used for building purposes. The site was graded and seeded to lawn grass.

The new garage and storage building, work on which was commenced last year, was completed in the early winter.

A general grading program was carried out in the early summer. A low retaining wall was built in the plat before the house and the ground behind it filled in, graded, and seeded. The main driveway into the farm was graded, drains installed, and a heavy surface application of cinders put on.

A new driveway from the house to the garage was built, and a new service road from the garage to the dam and lower flat.

A general repair and painting program was carried out in the fall months, the utilities building being repainted as well as some of the smaller buildings and pens.

A new well was dug in the lower end of one of the large wintering yards and a 10 x 10 foot pump house erected above it. An underground pipe line was laid connecting the pump house with the tanks, and surface lines run from the tanks to various points in the rearing field. An electric power line to operate the pump was run from the garage to the pump house.

Twenty new quail breeding pens of the Torrey type, 10 x 6 x 5½ feet were built during the winter, and ten Torrey shelter boxes to supplement ten already on hand, were built for use in connection with these breeding pens. Twenty-five wire-floored quail pens suited for both rearing and wintering were built, and twenty-five Torrey shelter boxes were constructed to be used with them. These pens are of a new type, 10 x 3 feet, and 3 feet high in front and 2 feet in the rear; shed roofed; roof, back and ends of Homasote and the front wired. They stand on wire floors, resting on gravel-filled frames which bring the floors up eight inches above the level of the ground, thus preventing flooding in sudden thaws. Twenty-five quail brooders, Wood type, were built.

Five large range pens were constructed on the lower flat, four covered, the fifth open. The covering wire will be removed before winter to prevent it being borne down by heavy snows.

A large, permanent automatic trap for the capture of escaped birds and prowling vermin was constructed outside the guard fence at a particularly strategic point.

No reforestation was done.

**NEW EQUIPMENT.** — After years of negotiations electric service was secured, and the house, utilities building and garage, wired. Outlets for eight incubators were provided in wiring the incubator cellar, and the quail brooder yard was wired with outlets for sixty brooders in six parallel rows of ten brooders each. Two powerful flood lights were installed on twenty-five foot steel poles to light this area at need.

A combination saw and planer outfit was purchased second-hand, and with a new five horse-power electric motor, was installed in the workshop.

A Buffalo No. 6 electric incubator with a capacity of 1,200 pheasant eggs, was purchased. Electric heating elements were purchased and installed in the seven Charters incubators, without interfering with the oil-burning systems, thus permitting optional operation of these machines by either oil or electricity, or a combination of the two.

Specially constructed trays for turning eggs were secured for the new Buffalo and the seven Charters incubators.

Twenty-six new type Coleman electric brooder heaters were purchased for the quail brooders, and twenty-six of the old conical type, equipped with a new type of heating element designed by Albert Torrey of the East Sandwich Game Farm. These were installed in the new quail brooders and in the old Coleman brooders, replacing the small oil heaters in the latter.

Six thermostatic heat regulating devices were purchased and installed, each device regulating the flow of current through one line of ten brooders.

An automatic, low temperature and power-off alarm, siren type, was installed in the quail brooder system.

A considerable amount of minor equipment; automatic watering devices, feed hoppers, green food racks, quail feeder guards, vermin traps, etc. was purchased or constructed during the year.

**PHEASANT BREEDING.** — The year opened with 262 adult pheasants on hand as brood stock and 561 adult pheasants as egg stock. It was subsequently decided to merge these two flocks into one, to be designated as brood stock. Of these, one cock and 28 hens were lost, and eight hens escaped (through collapse of a snow-laden holding pen) prior to the opening of the laying season, leaving 786 (695 hens and 91 cocks) to go into the breeding pens. The usual ratio of eight hens to a cock was observed in mating, and an experimental flock mating of 50 hens and 11 cocks was made, the birds being wing-clipped and confined in a large open-topped pen. There were five surplus hens on hand.

The first egg was picked up on April 8, the last on July 11. Total collections, 21,134 eggs. The first eggs were distributed on April 27. 10,640 were distributed to applicants, 1,500 transferred to the Marshfield Game Farm, 96 discarded as unsuited for incubation, 24 unaccounted for, and 8,874 set in incubators. There were 5,733 eggs which were infertile, contained dead germ, dead embryo or otherwise failed to hatch, and 3,141 hatched.

The poor results in hatching were due to a considerable extent to the fact that the change from oil to electricity as a source of heat brought about an entirely new set of problems with regard to ventilation and supplied moisture. The temperature control was nearly perfect, but much study and many experiments were required before a satisfactory balance of ventilation and moisture could be arrived at. Again, a period of dull, wet weather, with low barometric pressure accompanied by violent electrical storms occurred early in June when the largest settings of the



year were in the machines, and the mortality among the developing embryos during this period was enormous. There appears to be a connection between periods of low barometric pressure and negative results in incubation, but there is no available scientific data covering this phenomenon. It is a theory that may well be subject of research by skilled experimenters.

Of the 3,141 chicks hatched, 1,596 were lost, escaped, carried off by vermin or otherwise unaccounted for and 1,545 were reared. Of these 971 were distributed to clubs for wintering and 574 reserved for brood stock.

Of the 786 adults on hand at the beginning of the breeding season one cock was distributed for exhibition, 72 cocks and 432 hens for liberation, 1 cock and 2 hens for breeding, 74 escaped, were carried off by vermin or otherwise unaccounted for, and 15 cocks and 189 hens are on hand for next year's brood stock.

No changes in feeding or methods of brooding were made. Young birds were transferred at eight weeks of age from the brooder runs to the new range pens of the lower field. Those selected as future additions to the brood stock were wing-clipped and carried in a large open-topped yard, being driven into a wire-covered section at night as a protection from vermin.

**QUAIL BREEDING.**—There were on hand at the beginning of the year 147 quail (17 cocks and 14 hens of the original stock of twenty pairs purchased in Virginia in the previous spring, and 116 birds reared on the farm that year). These were wintered partly in the breeding pens and partly in pheasant brooder pen units equipped with Torrey shelter boxes. A sudden thaw on the night of February 13 when the ground was covered with two feet of snow, flooded the pens badly and resulted in the loss of five of the old birds and two of the young ones. It was necessary to house the birds in small groups in the elevated Coleman brooder runs for the rest of the winter.

Losses up to the beginning of the breeding season, May 2, were (including the 7 above) old birds, 1 cock and 6 hens; 1930-hatched birds, 30. Thirteen pairs were distributed in April for breeding purposes, leaving 84 on hand at the beginning of the breeding season. Forty pairs were placed in the breeding pens, one pair placed in a wire-floored pen as an experiment, and two surplus cocks were retained for possible replacement purposes. Of the 41 hens mated, only eight were of the original stock and 33 were young reared on the farm. A majority of these last were late-hatched and proved very poor layers. The first eggs were collected on May 25 and the last on September 21.

1,462 eggs were collected of which 16 were discarded because of the lateness of the season and 1,446 set in incubators. Of the eggs set 1,068 were infertile, contained dead germ, dead embryo, failed to hatch, or produced cripples, and 378 normal chicks hatched. 230 were lost and 148 placed in wintering pens and are on hand November 30. There are also on hand 100 early hatched chicks transferred from the Wilbraham Game Farm because of lack of pen space at that station.

The extremely negative and unsatisfactory results of the year's quail breeding operations may be attributed to two basic causes. The first, the poor quality of the breeding stock, due to their immaturity, resulting in an unusually small egg yield and a lack of vitality in many of the eggs laid and in the chicks hatched from such eggs. Secondly, the same problems encountered in correct operation of the electrified incubators in the pheasant hatching were further complicated by the fact that it was discovered, after many comparative failures, that the requirements for hatching quail eggs were radically different from those necessary to successful pheasant hatching. Where it was essential in hatching pheasants that the humidity be reduced to a comparative minimum during a ten-day period, thus drying down the egg contents, a similar procedure was



fatal to developing quail embryos. It was found necessary to maintain a humidity of around 50 to 55 degrees throughout the entire period of incubation and to step this up as high as it was possible to attain (around 77 degrees) at time of actual hatching. It was found that a slight increase in average temperature during incubation resulted in premature hatching, that chicks so hatched included a high percentage of cripples, and that mortality from apparent intestinal troubles ran very high among such broods.

There have been no indications of deaths being caused by communicable disease among the chicks reared this season, none of which have ever set foot on ground since they were hatched. Blackhead and stomach ulcerations were indicated in some cases of breeders lost during the year, although all breeding pens were located on clean ground when set up in the spring. Three breeding hens were killed by their mates when the latter became infuriated because of the attentions of a stray wild cock that would alight on the pens. Several birds were lost through being frightened by prowling cats to sudden flight against the sides or top of the pen.

Losses from vermin were considerably less than for any previous year.

As in other years, ninety percent of the green food used was raised on the farm. Poultry cabbage (a Chinese variety) was again the main staple supply for bird food and several tons were produced in the course of the year. This has proved to be the most reliable and desirable green food crop, particularly on light soils and in hot, dry weather. One of the valuable plants found in the series of experimental plantings was a Russian cucumber which was at least two weeks earlier than any domestic variety, an extremely prolific cropper and continued in full bearing until the vines were killed by frost about October 1. The fruit, of small to medium size and egg-shaped, was extremely tender and succulent and greatly relished by quail of all ages. A planting of Sorghum-Hegari was to ascertain its possible value as a source of winter food supply for wild birds. Although planted late (June) it made rapid growth and headed out freely, much of the seed maturing before frost killed the growth. The height averaged five feet and the plant stooled very freely. The stalks were very strong and of erect growth, had no tendency to lodge or bend over and appeared immune to, or resistant to the European corn borer. A parallel check planting of golden bantam corn was heavily infested with the borer. A light infestation of another borer of unidentified species was found, however, in the sorghum.

Of the 84 brood stock birds on hand at the beginning of the breeding season, 24 were lost, and 60 (43 cocks and 17 hens) remained on hand November 30.

*East Sandwich Game Farm — Harry A. Torrey, Supt.*

**NEW CONSTRUCTION.** — The \$400 assigned to this station for relief of unemployment was used in cutting trees and brush and burning the trash, in connection with building the entrance from the State highway along the Johnson dyke, and assisting on such construction jobs as were under way at the time.

Another vermin-proof quail breeding yard was built, known as No. 2 (similar to No. 1 yard completed in 1930), but more substantial, somewhat higher, and if possible, more completely vermin-proof. It measures 160 x 180 feet, contains 28,800 square feet of ground, located on a slight rise of ground, somewhat isolated from the other quail activities, and contains a somewhat better soil than prevails hereabout.

Still another vermin-proof yard, known as No. 3, adjacent to No. 1, was completed. It measures 80 x 372 feet and contains nearly three-quarters of an acre.

The old winter pheasant yards were stripped of the rusted and useless top wire and new poultry netting fastened in its place.

The workmen's camp was completely remodelled by removing the old

camp from its cement foundation and constructing in its place a one-story, two-room building, gable roof style, 10 x 16 feet. The old building, repaired and painted, was attached as an ell to the new building for woodshed and storage.

An incubator cellar was built on the quail area, 18 x 24 feet, 8 feet from sills to cement floor, and with eight-inch walls. Large double doors on the south side make it convenient to drive a truck inside, or easily accessible for storage purposes. Above the cellar is a one and one-half story workshop and storage building, practically completed outside but with the interior to be finished.

Along a double entrance from the State highway leading across the Johnson dyke (which had been widened and raised in the fall of 1930) trees and brush were cut, and marsh sods, thrown out by the diggers of the mosquito drainage ditches, were hauled and systematically placed on the north side of the dyke to protect it from high tides.

The workshop, mill, both incubator cellars, and brooder boxes were wired for electricity.

Several other projects are in the making, including the water system on the pheasant area and a start for one on the quail side.

No reforestation work was done during the year.

**NEW EQUIPMENT.** — A new all-electric incubator was purchased on trial and carefully tried out with pheasant and quail eggs, but did not produce satisfactory results and was returned as agreed upon.

Eleven of the latest Coleman type of electric quail brooding units with thermostat and remote control were purchased.

**PHEASANT BREEDING.** — The year opened with 406 adults (77 cocks and 329 hens) on hand as brood stock, of which one cock and six hens were lost prior to the breeding season. The brood stock is carried at this station on the flock system, the only farm where this is the case. Four open yards containing about 21,000 square feet, respectively, are used for this purpose. The brood stock was broken up into four flocks, one for each yard, with the ratio of one cock to four or five hens. The birds have been kept more or less in these pens for several years, and much of the under cover has been removed. It is the natural tangle of upland and swamp characteristic of Cape Cod, with some cultivated green crop, such as oats and buckwheat. The merits of the flock system as compared to the small units in restricted breeding pens has been often discussed but no definite conclusion has been reached. There seems to be little difficulty in collecting the eggs, even in the tangled growth of these pens. It is certain, however, that the birds do not lay as many eggs as when confined in small units, nor is the laying season so long. The birds are kept in open pens throughout the entire year, except when driven into covered pens to be clipped.

The first eggs were picked up during the week of April 6, and the last on June 13. 10,899 eggs were collected, all of which were set in incubators. 4,482 proved infertile, contained dead germ, or were otherwise lost, and 6,417 hatched, of which 1,131 were lost or unaccounted for and 5,286 reared. Of these six were used for exhibition, 2,333 liberated in open covers, 2,769 distributed to individuals and local clubs to be carried through the winter for liberation next spring as adults, and 178 are reserved for the 1932 brood stock.

Of the 399 adults on hand at the beginning of the laying season 27 were lost (a number of these were killed in May by great horned owls), 150 (76 cocks and 74 hens) liberated, and 222 remain on hand November 30.

**QUAIL BREEDING.** — The year opened with 415 adult quail on hand of which 221 (130 cocks and 91 hens) were liberated in open covers, 12 liberated on Penikese Island, three pairs distributed for breeding purposes, 6 pairs for exhibition and 84 were lost (16 in one night, caused by heavy rains backing up and flooding their shelters while the deep snow was on the ground). The remaining 40 pairs were used for brood stock.



The first collection of eggs was made on May 12 at which time 74 eggs were picked up, some having been laid in April. The last collection was 6 eggs on October 12. A total of 3,228 eggs were collected averaging slightly over 80 eggs for each hen. The lowest production from one hen was 47 eggs and the highest 129, with seven birds laying over 100 eggs each. All eggs collected were set.

Of the 3,228 eggs collected and incubated, 1,183 proved infertile, contained dead germ, or were otherwise lost, and 2,045 hatched, of which 526 were lost or unaccounted for and 1,519 reared. The hatching percentages were not up to expectations and it appeared that a number of pairs were mismated and produced many infertile as well as non-hatchable eggs although all hens laid. Of the 1,519 reared, 817 were liberated by the wardens in closed counties, 25 shipped to Penikese Island, and 677 are on hand November 30, held for 1932 brood stock and for spring release.

Of the 40 pairs on hand at the beginning of the breeding season 42 birds (22 cocks and 20 hens) were liberated after the breeding season and the remaining 38 adults are held over as a part of next season's brood stock.

The past season, in strong contrast to the previous two very dry ones, has been reasonably wet so that at no time was there any lack of green stuff.

Too much cannot be said in favor of the vermin-proof yards for quail protection. This is the first breeding season since 1914 that the quail have been free from more or less destruction from weasels.

**RUFFED GROUSE.** — The year opened with 12 grouse on hand, 5 hens (of which four were 1930 hatchery-reared and one a gift, imported Canadian stock) and 7 cocks (of which four were 1930 hatchery-reared stock, two wild wing-tipped birds and one reared by an experimental breeder).

The hens were paired with 5 cocks and placed in pens such as were used for quail breeding. Two hatchery-reared cocks were held as spare birds. Results from the five pens were—

1. Cock killed the hen.
2. 12 eggs, all infertile (brother and sister).
3. Hen (Canadian) very wild and failed to lay.
4. 14 eggs (11 of which proved infertile).
5. 16 eggs (2 soft-shelled, and 14 which proved fertile).

The fourteen eggs from Pen 4 together with the 14 from Pen 5, were set in two lots, from which 16 young hatched. Thirteen young died within a few days of hatching, and 3 appeared in a fair way to maturity until at 15 weeks old they sickened and died.

Of the adult brood stock, 6 cocks and 4 hens in strong and healthy condition, remain on hand at the close of the year.

*Marshfield Game Farm — L. B. Sherman, Supt.*

**NEW CONSTRUCTION.** — The \$300 assigned for unemployment relief had been allotted for outdoor work; but owing to much snow and extreme cold at the time, the cellar was cleared of incubators so that it could be used as a workshop where, under cover, 50 pens (for use as breeding houses for adult quail) were built and painted.

The breeding houses were built as near vermin-proof as possible and were set on posts from 1 to 2½ feet high, as needed, with inverted pans placed on the tops of poles to prevent vermin from ascending to the pens. Board floors were laid with openings to allow for cleaning.

In the regular construction work, all the top covers to the forty-two Coleman type houses were removed and replaced with new ones that screwed on and had a divided section in the top for opening, so that no birds could escape while feeding. The old covers had been found too heavy to handle, and dangerous to the young birds. The discarded covers were used in the adult quail houses as shelters.

Preferring smaller and more compact coops for use with birds from one



to twenty days old, new coops were designed and built and have proved very satisfactory. These were placed on standards about thirty inches above the ground and in each the Coleman-Hunter type heating unit was used, the round one being preferred. New wires were installed for the 25 new units with the entire control in the camp. The coops were constructed with sides, slides and ends of glass and with removable watertight covers, thereby allowing the chicks to go and come at their pleasure, depending on weather conditions.

New runs were constructed for use in front of the Coleman type house for the next older quail.

The meadow was cleaned up and new yards made across from the pens.

**NEW EQUIPMENT.** — The camp was purchased; new water system put in all outside yards; 25 40-watt heating elements from Hunter and 11 Coleman heaters purchased and installed; pipe and sprayers bought to irrigate green food area; Kohler system installed. The latter was installed early in the season in the camp where the superintendent slept. This system was arranged with all bells and lights necessary for alarms in case the local power went off. Several times during the season the power went off and the Kohler unit was always of great help in such emergencies.

**PHEASANT BREEDING.** — The year opened with 456 adult pheasants on hand (417 of last year's brood stock, and 39 which had been held over). Of the 39, 15 were lost, 14 liberated on the farm, and 10 cocks distributed for liberation.

To the 417 adult brood stock were added at the beginning of the laying season 25 hens purchased from a dealer. Up to the beginning of the laying season 42 brood stock birds were lost, leaving 400 (69 cocks and 331 hens) on hand at the beginning of the laying season.

The birds were mated four and five hens to a cock.

From this stock 13,625 eggs were collected, to which were added 1,500 from Ayer Game Farm, making 15,125. 392 were held for feeding later to the young birds and 14,733 were set in incubators. 8,784 proved to be infertile, contained dead germ, or were otherwise lost, and 5,949 eggs hatched.

Of the 5,949 hatched, 2,253 were lost and 3,696 reared. Of these 1,581 were liberated in open covers, 1,956 distributed to clubs and applicants to carry through the winter for liberation in the spring as adults, and 159 are on hand November 30 (reserved for additions to the brood stock).

Of the 400 adults on hand at the beginning of the laying season, 202 (65 cocks and 137 hens) were distributed, 27 lost, and to the remaining 171 were added on November 28, 70 cocks purchased from a commercial dealer for 1932 brood stock, all of the brood stock cocks having been distributed after the season. The year closed with 241 adults (171 hens and 70 cocks) on hand November 30.

**QUAIL BREEDING.** — The year opened with 306 quail on hand, and on April 19 there were 42 pairs placed in the new breeding pens previously described. The floors were covered with sand which can be renewed as often as needed. Inside each pen in the northeast corner were put all dishes for feed and water; and as shelter from the rain the discarded covers from the Coleman type brooders were mounted on legs two feet above the floor. The covers for nesting were put in the other corner, and in the open runs straw was strewn in the event they preferred to nest in the open.

Of the remaining 222 of the birds on hand at the beginning of the year, 190 (111 cocks and 79 hens) were liberated by the wardens prior to the laying season, 5 pairs distributed for breeding, and 22 were lost through fighting.

The brood quail laid well, and from the 42 mated pairs 3,225 eggs were collected. A warden brought in 15 eggs taken from a nest after a hen had been killed, making 3,240 eggs set in incubators. 951 proved infertile,

contained dead germ, or were otherwise lost, and 2,289 hatched of which 1,080 were lost or unaccounted for, and 1,209 chicks were reared. To these were added 43 birds reared by an individual from three pairs of breeders received from this Division in the spring.

Of the 1,252 birds 40 were sent to the Wilbraham Game Farm to be used as breeders next year, 677 were liberated in closed counties, and 535 (including 43 reserved) remain on hand November 30.

It was found that the young quail mature much earlier than do pheasants, as birds hatched in June were ready for the open in August, fully feathered and almost full grown as to size. All the birds were taken off the wire runs and put in houses and yards before they were released.

Of the 42 mated pairs on hand at the beginning of the laying season, 10 cocks and 16 hens were lost, leaving 32 cocks and 26 hens on hand November 30.

Several lots of lettuce and poultry cabbage were grown for the birds.

*Wilbraham Game Farm — Frederick W. Wood, Supt.*

NEW CONSTRUCTION. — The \$400 assigned to this station for relief of unemployment was used for cutting down trees on a section of the farm not previously cleared.

Twenty-three quail brooders of a new style were constructed, differing from the Coleman brooder in that the brooder and run are in one unit, and there are trays under both the run and the brooder compartment that can be quickly removed for cleaning.

Frames were set up and 20 of the new brooders were put in position (3 being sent to the other farms as samples). Electric wiring and Coleman heating units were installed. Four thermostats (from Morris Hunter, Richmond, Va.) were set up, one thermostat to each row of 11 brooders, one brooder in each row being used solely as a thermostat unit. This allowed the use of 10 brooders in each row for quail, or 40 chick brooders in all. Previous to this season the brooders were operated without the use of thermostats.

Forty Torrey holding cages and 40 Torrey shelter boxes were constructed, 20 of each to be used as breeding cages this season and the remaining 20 each to be used as holding cages.

A breeding and holding area for the quail was set off and surrounded by 1,800 feet of weasel proof fence.

Detachable 6 x 10 foot frames were made for each of the permanent pheasant pens. These frames were used as a section of each pen and can be removed to back the truck into pens when putting in fresh sand, and when cleaning them out.

Twelve large feed hoppers were constructed for use on the range, and 16 green feed hoppers for use in the intermediate yards.

Two portable 350 x 25 foot pens were built to test their practicability as holding pens for full-winged young pheasants. They have proved very satisfactory.

The farm buildings and all brooder houses were painted.

Fifty-five acres of land were plowed and seeded, 45 to rye and 10 to oats and clover. Twelve acres of winter wheat and the 10 acres of oats were harvested through an arrangement whereby the man who did the work received half the crop.

Some of the brush was burned and some of the stumps pulled on the land cleared by the unemployment labor.

No reforestation was done.

NEW EQUIPMENT. — A new all-electric Buffalo incubator was installed.

PHEASANT BREEDING. — The year opened with 419 adult pheasants (54 cocks and 365 hens) on hand as brood stock. This stock was carried through the winter in the vegetable garden, the birds having been placed there early in October, 1930 when there was plenty of kale, cabbage, and chicken cabbage, that they could feed on. Chapin Kernels were fed once



a week, or when the hoppers needed refilling and grit, charcoal, and fresh water were kept before them at all times. During the third week in March the birds were transferred to the breeding cages, and mated six hens to a cock. Losses of six cocks and 44 hens (of which 5 cocks and 30 hens had been killed by a dog) reduced the brood stock to 48 cocks and 321 hens at the beginning of the laying season.

During the breeding season, the feed consisted of Chapin Kernels, grit, oyster shells and fresh water. The feather picking which started the first of May had been completely eradicated by the end of the month. It is hard to say whether the cure was due to the 1% mineral added to the Kernels, or to the removal of the birds from their location on grounds completely denuded of vegetation to new ground which supplied green food.

The first egg was picked up on April 4, and from then on eggs were collected daily to a total of 18,724 of which 4,122 were either broken or held for feeding young birds later, and 14,602 set in incubators.

The first setting of eggs was placed in the new Petersime electric incubator on April 30. In using the Petersime, last year's practice was followed of transferring the eggs on the eighteenth day to the oil-heated Buckeye machines to complete the hatch. During the first week in May one of the heating elements burned out in the Petersime, necessitating transfer to the oil-heated Buckeye machines, and as the same temperature and rate of humidity as in the Petersime cannot be gotten in the small machines, this transfer undoubtedly affected these eggs. After replacing the burned-out element no more trouble was experienced. Eggs were also tried in the Buffalo machine and the manufacturers' instructions were followed until it was found that the best results could be obtained by keeping the ventilators closed at all times and spraying the eggs with warm water during the first and third weeks.

Of the 14,602 eggs set 7,071 were infertile, contained dead germ, or were otherwise lost, and 7,531 hatched of which 2,799 were lost and 4,732 reared. No disease was noted during the season. The losses of young chicks were mainly due to improper incubation and accidents. No changes were made in the method of feeding.

Of the 4,732 young birds reared, 827 were liberated in covers, 3,685 distributed to applicants and clubs for carrying through the winter and liberation next spring, and 220 are on hand November 30 to be added to next year's brood stock.

To the 369 adults on hand at the beginning of the laying season were added late in October fifteen cocks purchased from a dealer. 100 (96 hens and 4 cocks) of the brood stock were distributed after the laying season, and 21 hens lost, leaving 59 cocks and 204 hens on hand November 30.

**QUAIL BREEDING.** — The year opened with 32 adult quail (19 cocks and 13 hens) on hand of the original 1930 brood stock and 423 of the 1930-hatched birds. During the winter most of these were carried in the original flocks on the ground in the breeding cages. In February six wire-bottom cages were constructed, set on stakes 18 inches above ground into which were transferred 100 birds from the ground cages and held in these until distributed in April. These birds were cared for with less trouble than others; they were free from vermin and all other ground troubles, such as snow and floods; and were in as good condition when liberated as those held on the ground. About the middle of March when the weather became mild the birds started fighting and during the next four weeks 49 were lost from this cause. The fighting reached its height between the last week in March and the first week in April.

During the winter all birds were fed Kernels, clabber, and such green food as could be procured, the Kernels and clabber being continued throughout the breeding season. Towards the end of May milk and canned tomatoes were fed on alternate days. The tomatoes were fed in the



same manner as the milk, that is, in glass dishes on the galvanized feeding screen. Later this was found to have been a mistake. During June seven hens were lost from an unknown cause, and two from disease. Several of these birds were examined by Dr. Glen L. Dunlap of the Massachusetts Agricultural College at Amherst, who could find no cause for death, but suggested protein poisoning and recommended discontinuance of clabber. As this did not seem reasonable the feed and feeding methods were carefully checked by the superintendent and the possibility recognized that the birds might be picking up and eating pieces of the tomatoes from the wire screen and dying from acid poisoning. The tomatoes were fed thereafter in the dishes out in the pen on the ground. After this there were no more casualties except by cannibalism and disease at the end of the breeding season.

Two pairs of birds were carried on wire floors during the season. One hen laid 56 eggs and the other 38, whereas the records of the birds in the ground cages were 133, 126 and 117, with 32 the least laid by any hen.

There were no changes made this year in the plan of feeding the young quail.

Of the 423 1930-hatched birds on hand at the beginning of the year, 69 were lost, 302 (150 cocks and 152 hens) distributed for liberation, 2 pairs for breeding and the remaining 48 (21 cocks and 27 hens) were added to the brood stock.

The first week in April 40 pairs were selected and transferred to the breeding cages. On April 25 the first eggs were seen in the nests, and from then on all eggs laid were collected once each week. It has been customary not to disturb the birds during the laying season, by moving them to fresh ground. As an experiment ten cages were moved, during July, to fresh ground, and when the eggs were collected at the end of the week, one hen that had just started laying had not laid at all that week; three hens that had been laying six eggs per week laid only five, four hens laid seven eggs each, and the other two laid four each or one egg each more than the previous week. From this it would seem the birds could be moved during the breeding season without ill effect.

From these 40 pairs of breeders, 2,949 eggs were collected, one of which was broken, 36 distributed, and 2,912 set. Of these 937 proved infertile, contained dead germ or were otherwise lost, and 1,975 hatched of which 685 were lost and 1290 reared.

Of the young birds reared 618 were liberated in closed counties, 100 sent to Ayer Game Farm because of lack of space at this station to hold them. To the remaining 572 were added 40 of this year's hatched birds from the Marshfield Game Farm so that there are 612 young birds on hand November 30.

Of the 40 pairs of breeders on hand at the beginning of the breeding season 31 were lost, leaving 49 on hand November 30.

**COTTONTAIL RABBITS.** — From several of the closed areas in the State, 93 rabbits were trapped and sent to this station to be held as brood stock. These were placed in the area fenced off last year.

## FIELD PROPAGATION AND SALVAGE WORK

### *Merrill Pond System — Arthur Merrill, Supt.*

The greater part of the \$500 allotted to the hatchery and ponds for unemployment relief was used mostly for clearing land for pond development.

In the general improvement work for all ponds limited sections about the dams and along the roads bordering the ponds were kept free of brush, grass and weeds during the summer. 11,125 trees and shrubs were set out, and for this planting large sections of brush land were cut and burned over. Native trees, and some very rare in this latitude were located in the reservation and supplied for the Arboretum at Holy Cross College.

**STOCKWELL PONDS UNIT.** — At the Arnold dam a storm overflow was built in to spill flood water through the cranberry gravel pit, and over the road passing that point to the Adams Pond. Most of the work involved was in covering and protecting this road with stone.

The next two of the ponds in this unit having been substantially completed and standing the test of a most severe flood, required no work except in cutting brush about the dams and timber in the flowage, and putting sand in the channels to improve drainage.

At the Putman Mill Pond sand was put in and a start made at the back outlet that would carry a larger volume of flood water.

The trap at this dam (in use from the beginning without substantial change) was inadequate to properly handle or properly grade the increasing masses of fish handled, and there was an increased percentage of small fish killed by handling in mixture with the large ones. Work was started on an enlarged and improved trap by cutting out the old mill foundation on the lower side, building a road to load at a lower level, and excavating a site for grading boxes where all fish handled can be graded as to size and partly separated as to species, and much of the shipping done from this point.

**WELSH-SULLIVAN UNIT.** — Construction on this dam having been halted until a section of the Eight Lots Road crossing the pond could be raised, no work was done on the dam; but during the winter, when snow on the ground and heavy ice on the pond permitted, long sections of stone walls contributed by the Welsh family were hauled across the ice on sleds and dumped along the section of road to be raised to make a stone foundation to the water level for holding the road fill. This was one of the large jobs of the year and was undertaken to correct a dangerous condition caused by flowing the pond. While the pond was drawn concrete work was done about the flume to remedy a defect in the arrangement for cleaning out the pond, and to repair damage caused by the June flood. The trap for this pond was improved by adding a grading rack to separate the sizes of fish while in the trap.

**SUTTON-THOMPSON UNIT.** — At the beginning of the year a period of favorable weather was utilized in laying stone and putting additional fill on the Thompson dam to get additional flowage, since the program of finishing this dam at the end of the previous year could not be carried out, and before the breeding season the needed stock had been secured from the salvage operations and put in.

The wood on the flowed area, and reserved to the lessee, was cut by him.

At the Sutton Pond the overflow around the south end was enlarged, and rocks were bedded in the clay below the dam to carry this overflow water without scours that might endanger the dam.

Below this dam and to the Arnold Pond, where the brook has a descent of about 100 feet, the rocks ripped up by March and June floods and partly blocking the channel, were cleaned out and the channel enlarged.

On the Sutton tract, construction of the Lower Sutton Pond was started and carried to a point where it could be utilized for trapping the fish from the Sutton and Thompson Ponds, and later to hold stock reserved for the ponds below while the latter were being drained.

Construction was started the first of December to get a foundation that would permit winter work, then at periods through the year. In the early part of the year the rock work for the flume and trap were put in, and in July a concreting crew employed to put in monolithic concrete lining the flume, and extending the central core 24 feet each side. In August a power shovel was at work four days in opening up for an extension of the core and the construction of a flood overflow, collecting material to be used for filling, opening a pit where the material for the fill would be mainly taken, and building a road to this pit. During the latter part of the year the material adjacent to the completed core was levelled and partly faced with rock.



On this tract a large amount of brush on the site of the dam, and in the flowage area, was cut and burned, and much of the heavy timber, reserved by the lessee (the Town of Sutton), was removed by the Board of Public Welfare in unemployment relief.

On the Young tract, covering in part the site of the dam and flowage, a large amount of clearing was done in the winter unemployment program, and to prepare this section for tree planting.

**RESTOCKING, BREEDING AND PRODUCTION.** — During the closing period of the operations of 1930, brood stock, and fingerlings for yearling stock, had been sorted out for restocking the ponds. Blue gills were largely discarded and crappie and calico bass substituted. The stock of horned pout was deficient, especially of fingerlings, as 1930 had been an abnormally poor breeding year. The stock of perch was increased to make up in part the deficiency, and crappie and horned pout breeders were secured for salvage operations.

During the breeding season (on June 10), a flood of unusual proportions, that taxed all dams to the limit, flowed over two, and flooded deeply the section of the Eight Lots road crossing the Welsh Pond, carried a large amount of stock down to Lake Singletary. A check on this drift was arrived at by picking up 300 crappie on the rocks below the Welsh dam, where they passed out of the small temporary outlet provided for excess flow until the main outlet could be put in use; also by a known stock of 400 breeding perch put in the Sutton Pond, and none being found in the drainage. These fish had been put into the pond just previous to spawning, had spawned, and from that time until October when the pond was drained, there was no flow over the dam that would carry them out, except the flood. The flood affected perch and crappie mostly, but only the last as to production for the perch had spawned previous to the flood. The spawning time for crappie comes late in June and through July.

Blue gills bred in unusual numbers in proportion to the stock put into the ponds. Horned pout bred in great numbers, apparently the greatest production for the amount of brood stock, yet attained. Pickerel bred well, but not in great numbers, and there was a continued disappearance of the larger breeders which appears to be the work of otter, these animals having a decided preference for large fish, and possibly this species. The crappie production was small, even in proportion to the reduced number of breeders, and the distribution was limited to what could not be readily separated from a general mixture. All that could be separated were returned to the ponds.

Shiners, common sunfish, and tadpoles were taken in reduced numbers, this resulting from the policy of keeping these down to a minimum, and wholly out of ponds where it is practical to do so, and the usual practice was followed of taking all fish out of the ponds as cleanly as possible and returning stock that was closely picked over to leave out undesirable species. This is not difficult with breeders, but requires long periods of sorting with the 100,000 or more fingerlings.

The following stock was planted in the ponds: from North Watuppa Lake, Fall River, 129 horned pout (12 to 15 in.); from Great Pond, Weymouth, 121 horned pout (12 to 15 in.); from Butler Ames Pond, Tewksbury, 201 horned pout (10 to 15 in.); and 890 crappie (7 to 15 in.).

**DISTRIBUTION.** — Distributions from the ponds to open waters, club rearing pools, and for display and study for the period of this report totalled 565,778 pond fish divided as follows: 221,172 blue gills; 13,710 crappie; 227,655 horned pout; 101,146 yellow perch; 2,093 pickerel; 2 large mouth black bass. In addition 290,990 food forms were distributed to open waters, club rearing pools, for exhibition, and to the Palmer Fish Hatchery.

#### HAROLD PARKER FOREST POND SYSTEM

In connection with the work done as part of the Forestry Division's unemployment relief program, a crew of 30 men cleared the trees of



cordwood size from the area which has been outlined for flowage when this system is developed. Smaller growth was left for cover for game birds. This work represents a substantial step toward the development of this system. Nothing could be done by the Fish and Game Division on this system on account of lack of funds.

### FISH SALVAGE UNITS

The two superintendents in charge of fish salvage work operated in the field on the same basis as in previous years with no changes in the style of traps used. Several new waters were trapped, but much still remains to be learned about the habits of pond fish and the time of the year and conditions under which they may best be trapped.

On the whole, both superintendents took considerably more fish than last year. Practically all were large size and in the spawning stage when planted. Many of the small mouth black bass and pickerel planted weighed four pounds or more, while the white perch and horned pout averaged over a pound each. The fish salvaged were transported to their destinations and planted by the superintendents in charge of the units.

The salvage operations resulted in the collection of 280,217 fish (245,240 by the salvage units and 34,977 from miscellaneous jobs by wardens) as well as 1,175 food forms collected by salvage units.

Of the 280,217 fish salvaged, 277,494 were distributed to open waters, 1,341 to the Merrill Pond System for breeders, 125 to the Palmer Fish Hatchery for breeders, 916 to club rearing pools, 260 for exhibition and study and 81 to the U. S. Bureau of Fisheries.

A galvanized fish tank for the transportation of live fish was added to Salvage Unit No. 1 to be used on the Reo truck. A detailed description of this tank is given under Fish Distribution.

At Quicksand Pond, Little Compton, R. I. Salvage Unit No. 1 operated from March 30 to April 9 in conjunction with the Rhode Island Commission of Fisheries, which received one-third of all the fish taken. Massachusetts furnished all the gear and three men, and Rhode Island supplied two men. Massachusetts' share of the fish all of which were planted in open waters, was: 1,500 white perch and 6,000 yellow perch. Total—7,500.

At Round Pond, Haverhill, Salvage Unit No. 2 operated from April 13 to April 22 and collected the following fish, all of which were planted in open waters: 785 horned pout; 192 pickerel; 810 yellow perch; 198 small mouth bass; 465 white perch. Total—2,450.

At Little Pond, Falmouth Salvage Unit No. 1 operated from April 13 to 20 and collected 24,000 white perch, all of which were planted in open waters. Total—24,000.

At Oyster Pond, Falmouth Salvage Unit No. 1 operated from April 21 to May 2 and collected the following fish, all of which were planted in open waters: 17,200 yellow perch; 14,500 white perch. Total—31,700.

At North Pond Reservoir and Doane Pond, North Brookfield, Salvage Unit No. 2 operated from April 23 to 27 and collected the following fish, all of which were planted in open waters: 350 blue gills; 8,250 horned pout; 925 pickerel; 8,100 yellow perch. Total—17,625.

At Cedar Meadow Pond, Leicester, Salvage Unit No. 2 operated from April 28 to May 8 and collected the following fish, all of which were planted in open waters: 10 pickerel; 9,650 horned pout; 23,250 yellow perch; 12,650 white perch. Total—45,560.

At Ludlow Reservoir, Ludlow, Salvage Unit No. 2 operated from May 1 to 19. Of the fish collected the following were planted in open waters: 195 horned pout; 75 pickerel; 3,030 yellow perch; 305 small mouth black bass. In addition 50 horned pout and 75 small mouth black bass were sent to the Palmer Fish Hatchery for breeding purposes. Total—3,730.

At Great Pond, Weymouth, Salvage Unit No. 1 operated from May 4 to 12. Of the fish collected the following were planted in open waters: 370 horned pout; 14 pickerel; 4,970 yellow perch; 4,840 white perch; 375 small

mouth black bass. In addition 121 horned pout were sent to the Merrill Pond System for breeding purposes; 12 horned pout to Harvard College for experimental purposes; and 20 horned pout, 1 pickerel, 32 yellow perch, 54 white perch and 9 small mouth black bass to the South Boston Aquarium for exhibition. Total — 10,818.

At Butler Ames Pond, Tewksbury, Salvage Unit No. 1 operated from May 16 to 22. Of the fish collected the following were planted in open waters: 1,600 blue gills; 900 crappie; 206 small mouth black bass. In addition 890 crappie; 201 horned pout; were sent to the Merrill Pond System for breeding; to rearing ponds, 385 crappie and 20 horned pout. Total — 4,202.

At Cooley Pond, Granville, Salvage Unit No. 2 operated from May 21 to 29 and collected 5,725 white perch, all of which were planted in open waters. Total — 5,725.

At Wenham Lake, Wenham and Beverly, Salvage Unit No. 1 operated from May 23 to 31, and collected the following fish, all of which were planted in open waters: 430 horned pout; 339 pickerel; 10,400 white perch; 421 small mouth black bass; 970 yellow perch. Total — 12,560.

At Meadowbrook Flowage Basin, Amesbury, Salvage Unit No. 1 operated from May 26 to 27 and collected the following fish, all of which were planted in open waters: 25 horned pout; 350 pickerel; 18,000 yellow perch; 250 white perch. Total — 18,625.

At Long Pond, Great Barrington, Salvage Unit No. 2 operated from June 2 to 10 and collected the following fish, all of which were planted in open waters: 130 pickerel; 1,190 yellow perch; 292 small mouth black bass. Total — 1,612.

At North Watuppa Lake, Fall River and Westport, Salvage Unit No. 1 operated from June 2 to 11. Of the fish collected the following were planted in open waters: 2,365 horned pout; 190 pickerel; 1,350 yellow perch; 6,350 white perch; 4,331 small mouth black bass; 3 wall eyed pike; 11 pike perch. In addition 129 horned pout were sent to the Merrill Pond System for breeding; and 2 crappie, 25 horned pout, 3 pickerel, 40 yellow perch, 25 white perch, 31 small mouth black bass, 6 pike perch were sent to the South Boston Aquarium for exhibition purposes. Total—14,861.

At Long Pond, Falmouth, Salvage Unit No. 1 operated from June 13 to 21 and collected the following fish, all of which were planted in open waters: 625 yellow perch; 1,350 small mouth black bass. Total—1,975.

At Lake Averick, Stockbridge, Salvage Unit No. 2 operated from June 11 to 18 and collected the following fish, all of which were planted in open waters: 70 pickerel; 205 horned pout; 1,280 yellow perch; 66 small mouth black bass; 40 large mouth black bass. Total — 1,661.

At Big Pond, Turner Park, Longmeadow, Salvage Unit No. 2 operated from June 20 to 26 and collected the following fish, all of which were planted in open waters: 2,150 horned pout; 75 yellow perch. Total — 2,225.

At Porter Lake, Forest Park, Springfield, Salvage Unit No. 2 operated from June 26 to July 2 and collected the following fish, all of which were planted in open waters: 1,450 horned pout; 6 trout. Total — 1,456.

At East Mountain Reservoir, Great Barrington, Salvage Unit No. 2 operated from July 21 to 22 and obtained the following trout, which were placed in a rearing pool (Blodgetts Pond), operated by the Great Barrington Fish and Game Club, 125 brook trout under 6 inches, 386 brook trout over 6 inches. Total — 511.

At Van Horn Reservoir, Forest Park, Springfield, Salvage Unit No. 2 operated from September 19 to 28 and collected the following fish, all of which were planted in open waters: 760 horned pout; 15 pickerel; 1,120 yellow perch; 500 white perch; 226 small mouth black bass. Total — 2,621.

At Crystal Lake, Wakefield, Salvage Unit No. 1 operated from September 21 to 26 and collected the following fish, all of which were planted in open waters: 275 horned pout; 125 pickerel; 200 yellow perch; 675 white perch; 223 small mouth black bass; 175 shiners. Total — 1,673.



At Silver Lake, Halifax, Salvage Unit No. 1 operated from September 28 to October 2. Results were so poor that all fish were returned to the lake.

At Coggshall Pond, Fitchburg, Salvage Unit No. 2 operated from September 30 to October 5 and collected the following fish, all of which were planted in open waters: 450 horned pout; 1,000 shiners. Total — 1,450.

At White Pond, Hudson and Stow, Salvage Unit No. 1 operated from October 5 to 8. Results were so poor that all fish were returned to the pond.

At Round Meadow or Merriam's Pond, Westminster, Salvage Unit No. 2 operated from October 7 to 16 and collected the following fish, all of which were planted in open waters: 700 horned pout; 8,450 pickerel; 14,500 yellow perch. Total — 23,650.

At Oakes Ames Estate — Briggs Pond, North Easton, Salvage Unit No. 1 operated from October 16 to 19 and collected the following fish, all of which were planted in open waters: 5,970 horned pout; 904 pickerel. Total — 6,874.

At Crystal Lake, Gardner, Salvage Unit No. 2 operated from October 17 to October 24 and collected the following fish, all of which were planted in open waters: 1,122 horned pout; 120 pickerel; 9 yellow perch; 100 small mouth black bass. Total — 1,351.

Several smaller lots of miscellaneous fish were salvaged, mostly by our wardens and superintendents, and the fish planted (unless otherwise stated) in local ponds:—

From Meetinghouse Pond, Westminster 81 small mouth black bass were sent to the U. S. Bureau of Fisheries, Nashua, N. H. Total — 81.

From Hales Brook, Chelmsford 150 crappie; 8,400 horned pout; 555 yellow perch. Total — 9,105.

From Sucker Brook below Welsh Dam, Sutton, 25,000 yellow perch. Total — 25,000.

From a number of small pools below overflow of North Pond, Milford and Hopkinton 700 yellow perch. Total — 700.

From Hemlock Brook, Williamstown 64 brook trout over 6 inches. Total — 64.

From Crystal Lake, Gardner 27 small mouth black bass. Total — 27.

## FISH AND GAME DISTRIBUTION

### FISH DISTRIBUTION

The fish distribution was handled in most instances about the same as in past years except for the addition of a large fish tank which was constructed during the winter months for the transportation of live fish, which was operated very successfully. This tank has five compartments, four of which are used for fish and one for ice, and oxygen from commercial tanks is released through pipes which pass through the tank into the water. It will carry 2,400 six-inch trout for many hours without loss, and is economical and safe.

The sportsmen's clubs assisted in the planting of the fish, and in many instances called at the hatcheries for the stock going into their local streams. All other shipments were made by the hatchery and salvage trucks and were planted by the superintendents assisted by the clubs.

**BROOK TROUT.** — By the fall of 1930 each station had selected its quota of fingerlings to carry through the winter for liberation in the spring of the present year.

There were distributed from the State hatcheries and by the salvage units, 202,975 fingerling fish, 34,160 fish under six inches and 266,780 fish over six inches in length, as well as 5,100 fish which were purchased.

At the close of the year there are on hand at all stations 434,974 fingerlings and 317 adults.

**BROWN TROUT.** — During the year 72,030 fingerlings, 1,400 fish under



and 31,581 over six inches, were distributed to public waters, to a club for further rearing and later distribution, and for exhibit, study, etc.

At the close of the year there are on hand at both the Amherst and Sutton Fish Hatcheries, 65,000 fingerlings and 529 adults.

**RAINBOW TROUT.** — During the year 2,406 rainbow trout under six inches were distributed to public waters and for exhibit. At the close of the year there are on hand 48,000 fingerlings, 5,100 yearlings and 944 adults.

**CHINOOK SALMON.** — The entire stock of 43,000 Chinook salmon fingerlings was distributed to open waters.

**SEBAGO SALMON.** — The 1,375 landlocked Sebago salmon reared at the East Sandwich Fish Rearing Station were planted in open waters.

**SMALL-MOUTH BLACK BASS.** — The entire production of 227,150 small-mouth black bass at the Palmer Fish Hatchery (with the exception of 13,500 turned over to the U. S. Bureau of Fisheries and 50 for display) were planted in suitable bass waters. The 8,316 bass collected from miscellaneous salvage jobs (with the exception of 81 turned over to the U. S. Bureau of Fisheries for breeders, and 40 used for display and 75 sent to the Palmer Fish Hatchery for breeders), were planted in local ponds.

**MUSKALLONGE.** — The New York Conservation Commission furnished 25,000 muskallonge fry, 12,500 of which were planted in the Connecticut River upon arrival. The balance was held for further rearing, and in October 753 (6 to 9 inches) were planted in the Connecticut River.

**WALL-EYED PIKE.** — The New York Conservation Commission furnished 250,000 wall-eyed pike perch fry, which were planted in open waters. In addition, 20 adults were taken by the salvage crews, 14 of which were planted in open waters and 6 used for exhibit.

**BLUE GILLS, CRAPPIE, HORNED POUT, PICKEREL, YELLOW PERCH, WHITE PERCH, PIKE PERCH, LARGE-MOUTH BLACK BASS.** — Pond fish of various species were distributed to open waters, club rearing pools and for display and study, as follows: From the Merrill Pond System — 221,172 blue gills; 13,710 crappie; 227,655 horned pout; 2,093 pickerel; 101,146 yellow perch; 2 large-mouth black bass. From the salvage units and miscellaneous salvage jobs — 1,950 blue gills; 1,437 crappie; 43,629 horned pout; 11,913 pickerel; 124,506 yellow perch; 86,434 white perch; and 40 large-mouth black bass. (The foregoing in addition to the 20 wall-eyed pike and 8,316 small-mouth black bass already shown under special headings above). From the Palmer Fish Hatchery 176 pickerel, 3,000 horned pout, 7,250 blue gills and 3,183 yellow perch. From a sportsmen's club 500 pickerel purchased and distributed.

**ALEWIVES.** — No distribution of alewives were made.

## FISH DISTRIBUTION FOR THE PERIOD DECEMBER 1, 1930, TO NOVEMBER 30, 1931

(This table does not show stock transferred from one station to another, nor does it show stock added as brood stock.)

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCT (SEINED, PURCHASED, ETC.)			Grand Total
	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exhibit, or to United States Bureau	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exhibit, or to United States Bureau	
Brook Trout:							
Eggs	60,000	-	160,000	-	-	-	220,000
Fry (food-sac stage)	-	-	5,000	-	-	-	5,000
Fingerlings 1 in.-4 in.	179,900	23,000	75	-	-	-	202,975
Under 6 in.	6,975	21,430	530	-	5,225	-	34,160
Over 6 in.	259,662	6,400	262	70	386	-	266,780
Total Brook Trout:							
Eggs and Food-sac fry	60,000	-	165,000	-	-	-	225,000
Fish 1 in. and over	446,537	50,830	867	70	5,611	-	503,915
Brown Trout:							
Eggs	-	-	3,000	25,000	-	-	28,000
Fry (food-sac stage)	-	-	300	-	-	-	300
Fingerlings 2 in.-4 in.	69,000	3,000	30	-	-	-	72,030
Under 6 in.	-	1,400	-	-	-	-	1,400
Over 6 in.	31,525	-	56	-	-	-	31,581
Total Brown Trout:							
Eggs and Food-sac fry	-	-	3,300	25,000	-	-	28,300
Fish 2 in. and over	100,525	4,400	86	-	-	-	105,011
Rainbow Trout:							
Over 6 in.	2,400	-	6	-	-	-	2,406
Chinook Salmon:							
Under 6 in.	43,000	-	-	-	-	-	43,000
Sebago Salmon:							
Under 6 in.	1,375	-	-	-	-	-	1,375
Small Mouth Black Bass:							
Fry up to 1 in.	174,000	-	-	-	-	-	174,000
Fingerlings 1 in.-4 in.	36,900	-	13,550	-	-	-	50,450
Under 6 in.	2,700	-	-	15	-	-	2,715
Over 6 in.	-	-	-	8,105	-	121	8,226
Total Small-mouth Black Bass:							
Fry up to 1 in.	174,000	-	-	-	-	-	174,000
1 in. and over	39,600	-	13,550	8,120	-	121	61,391
Large Mouth Black Bass:							
Over 6 in.	-	-	2	19	-	-	21
Over 12 in.	-	-	-	21	-	-	21
Total Large-mouth Black Bass:							
Bass	-	-	2	40	-	-	42
Blue Gills:							
Under 6 in.	221,627	-	86	600	-	-	222,313
Over 6 in.	6,551	-	158	1,350	-	-	8,059
Total Blue Gills	228,178	-	244	1,950	-	-	230,372
Crappie:							
Under 6 in.	13,003	-	38	1,050	-	-	14,091
Over 6 in.	425	-	239	-	285	2	951
Over 12 in.	-	-	5	-	100	-	105
Total Crappie	13,428	-	282	1,050	385	2	15,147
Horned Pout:							
Under 6 in.	204,865	4,000	54	12,235	-	-	221,154
Over 6 in.	20,735	650	341	28,572	-	20	50,318
Over 12 in.	-	-	10	2,745	20	37	2,812
Total Horned Pout	225,600	4,650	405	43,552	20	57	274,284

(Continued)

(Continued)

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCT (SEINED, PURCHASED, ETC.)			Grand Total
	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exhibit, or to United States Bureau	Planted direct to Public Waters	Dis- tributed to Clubs for Rear- ing to Larger Size before Liberation	Dis- tributed for Study, Exhibit, or to United States Bureau	
Pickereel:							
Under 6 in. . . . .	75	—	4	500	—	—	579
Over 6 in. . . . .	1,962	15	50	7,578	—	—	9,605
Over 12 in. . . . .	61	45	57	4,331	—	4	4,498
Total Pickereel . . . . .	2,098	60	111	12,409	—	4	14,682
Yellow Perch:							
Under 6 in. . . . .	83,988	5,000	8	30,485	—	—	119,481
Over 6 in. . . . .	14,080	925	267	89,554	—	52	104,878
Over 12 in. . . . .	—	—	61	4,395	—	20	4,476
Total Yellow Perch . . . . .	98,068	5,925	336	124,434	—	72	228,835
White Perch:							
Under 6 in. . . . .	—	—	—	24,650	—	—	24,650
Over 6 in. . . . .	—	—	—	61,705	—	79	61,784
Total White Perch . . . . .	—	—	—	86,355	—	79	86,434
Wall-Eyed Pike Perch:							
Fry (food-sac stage) . . . . .	—	—	—	250,000	—	—	250,000
Over 20 in. . . . .	—	—	—	14	—	6	20
Total Wall-Eyed Perch . . . . .	—	—	—	250,014	—	6	250,020
Muskallonge: Fry (Food- sac stage) . . . . .	—	—	—	12,500	12,500	—	25,000
Total Trout and Pond Fish (not including eggs and food-sac stage) . . . . .	1,374,809	65,865	15,889	277,994	6,016	341	1,740,914

In addition the following forms were distributed during the period Dec. 1, 1930 to Nov. 30, 1931:

Sunfish . . . . .	2,190	—	60	—	—	—	2,250
Shiners . . . . .	240	500	50	1,175	—	—	1,965
Crawfish . . . . .	2,750	—	—	—	—	—	2,750
Tadpoles . . . . .	284,000	—	—	—	—	—	284,000

### GAME DISTRIBUTION

The liberation of pheasants and quail during the spring and summer was handled by the wardens who released these birds in covers recommended by the county leagues after the latter had met in conference with the local sportsmen's clubs to decide on the covers to be stocked.

PHEASANTS. — Most of the pheasants produced at the game farms were distributed as usual to the local sportsmen's clubs and individuals who will carry them through the winter for liberation next spring. As this year's hatching of pheasants exceeded the applications for birds to winter, it was necessary to liberate a large number of early-hatched birds just prior to the first of September which allowed the birds to mature in the wild before the opening of the hunting season.

There were 10,640 eggs distributed to applicants, of which 3,477 hatched. Of these 985 were reared to the age of at least three months and liberated and 146 are being carried through the winter, making a total of 1,131 produced in this branch of the work.

There were 14,128 young and 970 adult pheasants distributed from the game farms either directly to covers, to be wintered by clubs, or for study, exhibit, etc. (See table).



At the close of the year there are on hand at the four game farms for brood stock 1,131 birds (1931-hatched) and 930 adults.

**QUAIL**— The young quail carried through the winter of 1930-31 were distributed as adults during April and each county received an equal share, while the young quail distributed in the fall were released in closed counties only. The number of young quail produced so greatly exceeded the superintendents' expectations that the stations were not prepared with equipment to carry through the winter all the birds reared. This necessitated the above-mentioned liberations. Each farm is filled to capacity with birds which will be liberated in the spring of 1932 in both open and closed counties. There were distributed from the game farms 2,112 young and 813 adult quail for liberation and breeding purposes, and there remain on hand at the close of the year 2,072 quail (1931-hatched) and 205 adult quail.

**WHITE HARES.**— There were 3,604 live hares imported and 25 trapped on a closed area in this State. Of these 3,626 were liberated in covers and 3 used for scientific study. Each year it is aimed to import as many hares after the close of the Massachusetts season as the trapping conditions will permit, and this year more than 75% of the hares purchased in Maine were so liberated.

**COTTONTAIL RABBITS.**— Penikese Island supplied 81 rabbits for restocking the mainland and 2 for scientific study. In addition, under the Division's supervision 302 rabbits were trapped on various closed areas and liberated in suitable covers. From the same areas 93 were sent to the Wilbraham Game Farm for brood stock, and 74 added to the stock at the Penikese Island Sanctuary.

GAME DISTRIBUTION — DECEMBER 1, 1930, TO NOVEMBER 30, 1931

[This table does not show stock transferred from one game farm to another, nor does it show additions to brood stock.]

	PRODUCT OF STATE GAME FARMS				NOT PRODUCT OF STATE GAME FARMS (PURCHASED, GIFT, TRAPPED, ETC.)		Total
	Dis- tributed for Hatching	Liberated direct to Covers	Wintered by Clubs and Others for Liberation in Spring of 1932	Dis- tributed for Study, Exhibit, Breeding, etc.	Liberated direct to Covers,	Dis- tributed for Study, Exhibit, Breeding, etc.	
Pheasants:							
Eggs	10,640	—	—	—	—	—	10,640
Young (reared by clubs and others from the 10,640 eggs reported above as distributed for hatching)	—	985	146	—	—	—	1,131
Young	—	4,741	9,381	6	—	—	14,128
Adult	—	966	—	4	—	—	970
Quail:							
Eggs	36	—	—	—	—	—	36
Young	—	2,112	—	—	—	—	2,112
Adult	—	755	—	58	5	—	818
Cottontail Rabbits:							
Adult	—	81	—	2	290	—	373
White Hares:							
Adult	—	—	—	—	3,626	3	3,629

## MARINE FISHERIES

### GENERAL

The quality of the fish offered for sale as food has been maintained at a high standard. A careful and constant inspection has been made at the ports of entry and the large producing plants and in addition the inspection work has been carried into every retail store within the state where fish is offered for sale. The merchants have been advised of the best methods of handling fish for the retail trade resulting in a marked improvement in methods and quality. This highly important inspection work, although restricted by the limits of the resources available, has been of great value to the industry and the public.

The marine fishing industries of the Commonwealth were more affected by the general depression in 1931 than in the previous year. This was caused by a very much reduced catch in practically every branch of the fisheries as compared with that of 1930 and is exemplified by the 23% reduction in the poundage received at the Port of Boston from the vessel fishery. The very low prices of all food products still further aggravated the situation. Investigations, being made by state and federal bureaus, have not at present disclosed any general cause for alarm although we are aware of the possibility that certain readjustments may need to be made.

In the shellfish areas the towns, encouraged by this department, have planted more seed clams and quahaugs this past year and have generally shown more interest in their shellfish territory. Where this has occurred very encouraging results have been obtained. The problem of the contaminated area is still a very vital one. The immense quantity of shellfish in the contaminated area is indicated by the fact that shellfish, to the value of nearly a quarter of a million dollars, were salvaged from polluted areas, by special permit, in the very few instances where this could be done with safety.

At the present writing the starfish menace to the southern shellfish beds has reached serious proportions. The estimated loss exceeded one million dollars. Some decisive action should be taken at once in order to save the generally abundant set of scallops on the southern shores of the State.

The active interest taken in conservation measures by associations of fishermen and dealers and their cooperation in various ways is especially encouraging. Only through intelligent cooperation between the state department and the fishing industries can it be hoped to obtain satisfactory solutions to the various problems so vital to the marine fisheries.

### INSPECTION OF FISH

The work of this office the past year has been continued along the same conservative lines.

To one conversant with the laws governing the work of this office it is easily seen that to the Inspector is given wide discretionary powers and while the final report for the year may not show a remarkable court record, still an analysis of the report as a whole will indicate to any interested person the fact that much has been done of a constructive nature, which has bettered the condition of the general fish product as it arrives to the consumer and at the same time has not injured the industry. It is felt also that notwithstanding the rather strict methods carried into effect by this office in its efforts to see to it that only good fish are provided to the public, it also has the approbation in its work of the major portion of those engaged in the catching, processing and the selling of fish on a major scale.

Early in the year the New England Fish Exchange, which is practically responsible for the handling of the fares of fish landed at the Boston Fish Pier, was somewhat emphatic in its request that the State have an inspector at the Pier from the beginning of operations in the



morning until the last fare of fish was taken out in the afternoon. This office was able to accord with their wishes from the fact that it was allowed to appoint an additional deputy inspector of fish. This was done on July 13, when Mr. William H. Brogan, of East Boston, was given a provisional appointment.

It is understood that this state of affairs has been very pleasing to every dealer on the Pier, and naturally, with the above in mind, it is pleasing to this office. It is felt that the more work of fish inspection, including grading and condemnations that can be done at the source of supply, namely the Boston Fish Pier or Gloucester, makes for better assurance that the fish goods displayed for sale in the various retail stores throughout the State will be of better quality and more liable to conform with the fit-for-food provision of the fish inspection laws.

Perhaps the most distinctive happening of the year in the work of fish inspection, and, indeed, one of the most unique since the work of the office was started in 1919, has been the arrival at Boston, direct from Japan via the Panama Canal, of five large consignments of frozen swordfish, the product of the Japanese fisheries. These goods were transported to Boston, in separate Japanese steamers and the incident is the first of its kind in the history of the New England fish business. The fish were caught, as far as can be ascertained, by Japanese fishermen on grounds adjacent to the Empire of the Rising Sun by small boats manned by few men. Details of methods of capture, etc. are not available at this office at this time, but it is understood that they are caught in a method similar to that employed by our own fishermen, that is by the use of the dart, or harpoon, or "lily iron", as it is commonly called. The fish were then landed and collected by carrying crafts and taken to freezers and there held to await shipment to market. In addition there were also received at Boston three cars of Japanese swordfish frozen, these being landed at California ports and trans-shipped to the Boston market.

The fish appeared to be well wrapped in swathings of thick paper and burlap, which was removed from ten per cent of each shipment on transference to the freezer in which they were placed in Boston; this, of course, for inspection purposes. The stripping of their outside garments from the fish showed that while some of the consignments could be considered as "good," others could be only designated as "fair" or "passable." As the fish were in a frozen state it was almost impossible to pass on each individual fish, and the only recourse for this office was to note the designation of the various lots as they went into the freezer and to keep tabs on these fish as they were taken out individually.

It is suggested here as a matter of policy and convenience also to the work of the inspectors, that the grading which at the present time applies to fresh food fish be also applied to frozen fish; for instance, fresh food fish are graded into three classes and then those unfit for food, while with frozen fish the fish are either fit for food or they are not.

For the information of the many who will be interested we append the following statement as to the arrivals of these Japanese frozen swordfish with some comment as to our opinion of their condition on arrival:

			<i>Condition</i>
Sept. 11	2 cars, 211 fish, 60,000 lbs.	.....	good
Oct. 2	Stm. Sanyu Maru, 383 fish, 100,000 lbs.	.....	good
Oct. 5	Stm. Tai Yang, 379 fish, 100,000 lbs.	.....	fair
Oct. 10	1 car, 153 fish, 40,000 lbs.	.....	fair
Oct. 19	Stm. Kwanto Maru, 366 fish, 100,000 lbs.	.....	fair
Nov. 5	Stm. Osaka, 351 fish, 100,000 lbs.	.....	fair
Nov. 7	Stm. Taiping Yang, 362 fish, 94,000 lbs.	.....	fair
	150 fish, 40,000 lbs.	.....	fair



Also this latter steamer brought 166 cases of cuttlefish, a species of squid, weighing 9,960 pounds, which came through in fine condition.

The work of lobster inspection has received marked attention during the past nine months and it is fair to say that the results obtained have been beneficial to the dealers, the fishermen and the consuming public. The work of lobster inspection presents many complexities. As the result of a conference in April between officials of the Division of Fisheries and Game, representatives of the lobstermen and the lobster dealers, the whole matter was left in the hands of the State Inspector of Fish pending a report from a biologist treating of all the points at issue and forming a basis for future legislative action. As the result of this conference the Director employed Dr. David L. Belding to take up the biological work.

This work of lobster inspection was begun on April 27 with the arrival of the first of the subsidized Nova Scotia lobster carrying crafts with cargoes from eastern counties of Nova Scotia and has been followed through up to date on a continuing inspection of all lobster shipments from Nova Scotia, including those by rail and steamer and lobsters from Maine and local quarters found at the cars of the wholesale dealers at Boston, Lynn, Beverly and Gloucester. The work was first undertaken under many difficulties as one deputy was practically obliged to combine this work with his regular Fish Pier labors. But the results justified the extra labor and later on in July, when a provisional appointment of a new deputy was made, the latter took over immediately the lobster work.

The insistent demand for this close lobster inspection came as the result of the influx in 1930 of large cargoes of Nova Scotia lobsters from crafts which were subsidized by the Canadian government, these crafts thus being enabled to bring their fares direct to the Boston market at a considerable money saving to the Nova Scotia lobster fishermen. Claims had been set up by the local lobstermen that these goods were coming through in condition which rendered a considerable portion of them not fit for food consumption, hence the very definite and minute examination of these cargoes in 1931.

Along with the examination of these cargoes as to their fitness for food was included work done at the request of the Canadian fisheries officials who desired much information with regard to the condition of each separate cargo. This entailed considerable work on the part of this office, but was willingly done as an exchange of international courtesy and a knowledge that the report made on the same could not but help in the bettering of conditions in the future.

It is due here to say that this office has received generally the finest sort of cooperation on the part of the lobster dealers, who have taken marked interest in the work and have shown a disposition to assist in every possible way in order that lobsters unfit for food may not reach the consumer.

As the result of this close lobster inspection work it is pleasing to note that in spite of the heavy condemnations of Nova Scotia lobsters, this office has received the thanks of the Canadian Department of Fisheries, and that no complaints of biased or unfair treatment were received from Canadian lobstermen or dealers. It is also gratifying to find that the work has met with the approval of our own State lobstermen as well as our dealers.

Dr. Belding has made a preliminary report, which reads as follows:

"I herewith present the following preliminary report upon the investigation of standards for the sale of lobster meat. At the present time I am completing a careful check-up of the standard devised in order to determine the possible variations. As you know, the condition of the lobster previous to death and the temperature at which

it is kept subsequent to death are factors which cause rather wide variations in the keeping quality of the meat.

*"Nerve-Muscle Reaction.* A test has been devised, based on the nerve-muscle response to the Faradic current, which apparently marks the point of earliest change in the muscle (meat). This test has the following advantages, although it merely sets an arbitrary standard:

"1. It can be carried out by any inspector after a little practice. It does not require a scientist to operate.

"2. It is clear-cut and capable of demonstration in court, as a positive reaction is shown by a contraction or flip of the tail.

"3. This positive reaction persists some hours after the death of the lobster; at room temperature an average of eight hours and at ice-box temperature sixteen hours. The length of time the nerve-muscle reaction lasts depends upon the condition of the lobster previous to death and the temperature at which it is held after death. The variation in time is being carefully studied to determine the range.

*"Quality of Meat.* Starting with the loss of response to the test, histological and other laboratory studies are now being made of lobster meat, kept under various conditions in order to determine the length of time before definite changes can be observed in the meat. These studies will enable us to report upon the time after the cessation of the reaction that appreciable changes in the meat occur. Likewise the keeping qualities of lobster meat are being observed grossly.

*"Cooked Lobster Meat.* Similarly the changes in cooked lobster meat are being followed with the hope of obtaining a suitable method of judging its quality.

"We have devised a test which, though arbitrary, has all the essentials of a clear-cut test suitable for court work. It will determine whether or not a lobster has been dead a definite length of time under a certain condition. It gives the point when the earliest possible change takes place in the muscle.

"We are now checking up the conditions causing variations in this test and are studying the changes in uncooked and cooked lobster meat subsequent to the cessation of response to this test. Owing to the varied conditions under which the lobster is held previous to and after death, this check-up involves considerable detailed study before the final report can be submitted."

The interest of this office in seeing to it that the individual purchaser of food fish is protected as far as possible is exemplified by the painstaking work in this direction which covers as far as possible, by careful inspection, the retail stores of the State. It is to be wished that this service could be broadened, but it is felt that within the limitations of funds available the work is being carried on on a high plane of only good fish to the table of the consumer and to the end that the purchases of fish in retail stores can be made with a feeling of real confidence.

With the placing at the disposal of the office in July another deputy, there was opened an opportunity of giving direct daily contact with the various concerns preparing fish for market through the filleting process. These plants, some 33 in number, have been visited daily in order to see to it that the standard which is really necessary in this line of prepared fish should be kept to the highest point, this with the realization that the filleting of fish today is one of the mainstays of the fish industry in distribution of marine sea food to near and farther extended markets.

As a general proposition our deputy has found evidence on the part of practically all engaged of an effort to maintain the highest standard possible. There have been cases brought to the attention of the office where on some occasions the goods came close to the line of cleavage between second and third grade, this being done possibly with the desire of ship-



ping goods that, while they would come within the regulations here at the point of shipment, yet might be unfit for food at their destination. Fortunately these cases have been few.

The following will give in concise form some of the major activities of this office during the past year. It is not designed as a table, but as pithy paragraphs from which may be gleaned much of interest:

Inspections in retail stores, 3,168.

Inspections in wholesale stores, 22,062.

Freezer inspections, 295.

Inspection of peddlers' carts, 250 weekly.

Inspections at Yarmouth, N. S. steamer, 78.

Vessel inspections at Gloucester, 1,939.

Total fish condemned at Gloucester, 30,000 pounds.

Ground fish condemned at Boston Fish Pier from fishing vessels, 58,150 pounds.

Condemned at Boston from consignments on Yarmouth, N. S. steamer graded as jellied, 70 swordfish (which weighed 19,520 pounds).

Graded at Boston Fish Pier from arriving vessels as No. 3 fish, 443,255 pounds, mostly haddock and codfish which therefore did not reach the retail markets of the State for home consumption as fresh fish.

Fish condemned at retail stores, 1,794 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 200 pounds salmon; 75,877 pounds smelts; 66 pounds scallops; 1,868 pounds mackerel; 200 pounds mulletts; 750 pounds pickerel; 250 pounds saugers.

Condemned, landed at Boston Fish Pier arriving by rail, 5,272 pounds miscellaneous fish.

Condemned, landed at Boston Fish Pier, direct, graded as "jellied" 124 swordfish (which weighed 36,276 pounds).

Inspected, arriving in Boston direct from Japan in Japanese steamers, 5 consignments, of frozen swordfish, 634,000 pounds.

Condemned, at landing and since from cold storage from the above Japanese consignments, 25 swordfish (which weighed 6,305 pounds).

Total swordfish condemned, 219 fish (weighing 62,101 pounds).

Inspections in wholesale lobster stores in Boston, Lynn, Beverly and Gloucester, 3,320.

Inspections on subsidized Nova Scotian lobster boats arriving at Boston, 29; pounds condemned, 43,811.

Lobsters condemned from Yarmouth, Nova Scotia steamer, 21,549 pounds; other Nova Scotian crafts, 17,515 pounds; and Canadian lobsters by rail, 29,290 pounds.

Total Canadian lobsters condemned, 112,165 pounds.

Total lobsters condemned from Massachusetts and other New England States, 35,097 pounds.

Grand total of lobsters condemned, 147,262 pounds.

Total fish condemned at Boston Fish Pier and at Boston from Canada by rail and steamers, 236,528 pounds.

Total inspections, 31,146.

Total fish condemned, 383,790 pounds.

Total court cases, 20.

Total convictions, 20.

#### STATE SUPERVISOR OF MARINE FISHERIES

For the first time in many years the marine fisheries have experienced a season in which practically every branch of the industry has had a marked decline, both in the quantity of production and in the financial returns. The table of the estimated value of fishery products shows that in 1931 there was a decrease in the estimated total value of more than



six million dollars. The only fisheries which did not show a marked decrease were the relatively unimportant razor clam and bait worm fisheries.

Such a general decline can have only one reasonable interpretation, namely, that it was a seasonal fluctuation such as occurs more or less periodically in the fisheries of all areas. They are the result of natural causes, little understood, and more or less beyond man's control. However, where natural causes affect a fishery, sooner or later a balance is reached and the fisheries will again thrive. A thorough study of these conditions is being made and will be valuable even though it may serve only to give advance notice.

One thing, which contributed in a marked degree to the lessened amount of fish brought in, was the great number of days of fog and adverse winds which occurred in nearly every month of the year. There were other contributing causes in addition to intensive fishing in certain areas. One of these was the small financial returns of some fisheries which at certain times was so extremely low as to lessen the intensity of the fishing. Very slight demand, prevalent through the entire year, was responsible in no small measure for the decrease in the amount brought to market. The above statements are especially applicable to deep sea fishing where opportunities for artificial control of conditions are very limited. There are problems, however, affecting the shore fisheries which, although very serious, are subject to human control or correction.

The one outstanding threat to the shellfish industry, particularly along the southern coastline, is the starfish. The annual toll which starfish take from the shellfish beds of the state, particularly in Buzzards Bay section, is tremendous. No accurate figures can be obtained as to the extent of the damage done, but instances, well known to the fishermen in each locality, may be multiplied in which beds of scallops, oysters, mussels, sea scallops, and even quahaugs have been entirely or nearly wiped out by them. An illustration of this was in the contaminated area of Mattapoisett last December when a bed of scallops, known by investigation to have a good supply, was thrown open by the Supervisor through a special form of permit. This bed was held in reserve until the supply in other beds had been exhausted, but when the fishermen began to dredge it their catch consisted almost entirely of shells and starfish. In the ten weeks elapsing between inspection and opening the bed had been virtually depleted.

The actual cost of the ravages of the starfish to the state is tremendous. In the scallop industry along Buzzards Bay it has been estimated—conservatively it is believed—that the supply this past year was reduced as much as 60% by starfish. This would mean a loss to the industry of more than \$1,000,000. It is not possible to wipe out the starfish so completely as to entirely eliminate the damage but it can be very greatly diminished. The selectmen of various towns have made appropriations from time to time to help fight the starfish. In some instances fishermen were paid for each bushel of stars brought in. In other towns the local shellfish wardens have been employed in systematically removing the starfish in their local waters; regulations have been passed in most towns to the effect that a fisherman's permit will be cancelled if he returns the starfish to the water. In spite of these efforts the starfish is a greater menace to-day than ever before. On March 12 the town of Wareham appropriated \$1,000 for destroying starfish, paying the fishermen a certain price per bushel of stars. The quantity of starfish was so great that the appropriation was exhausted in one and one-half days' fishing. Later on, another appropriation of \$1,000 by the town was exhausted in three and one-half days, in which time 4,000 bushels of stars—not less than one and one-half million in number—were brought in. Inasmuch as so many coastal towns are threatened by this menace and the failure of one town to act may result in counteracting anything done in an adjoining town, it would seem

very appropriate for the State to assist. We believe that the efforts of the towns should be supported by a State law against returning starfish alive to the water, and it is also suggested that a more active part be taken and a special appropriation be made by the State to assist in combating this menace. One very hopeful fact in this serious situation is the ease with which starfish may be removed from the beds without injury to the shellfish. Nevertheless, however well advised the plan may be, it will be necessary to make systematic efforts over an extended period in order to accomplish a real benefit.

The extensive shellfish areas declared contaminated and from which shellfish may not be taken as food, except through purification plants by permit, continue to be a most perplexing problem. Fully sixty percent of the court cases are for violations in connection with the polluted areas. The Supervisor is of the opinion, as stressed in earlier reports, that a commission should be appointed to make a thorough investigation of the subject and believes further that more frequent examination of the shellfish areas should be made. An account of the operation of the purification plants is given further on in the report.

One seasonal fact of considerable importance was the disappearance of the eelgrass along the entire shoreline. It began to disappear in 1929 and what was left went very suddenly in the latter part of the summer, leaving many shores almost bare. Various reasons have been assigned, such as local oil discharge, motor boat exhaust gas, etc., but in view of the very extensive areas devastated, most of these reasons are entirely inadequate to account for the facts, although it is noted that oil pollution has affected the eelgrass in certain areas in New Jersey. We are inclined to believe that it is a periodic occurrence brought to a climax in the late summer by the unusually high temperature of the water which prevailed at that time. Whatever the cause, the matter is of considerable importance to the fisheries. Not only does the grass serve to protect the shellfish from shifting sand but it is also essential as cover for the smelt and other fish which frequent the shores and as a breeding place for small marine life which is an important diet of the food fish. If the periodic fluctuation theory is correct, a heavy new growth may be expected next year.

Since the establishment of the office of marine fisheries, and, in fact, prior to that time, it has been repeatedly pointed out that the warden force and equipment were entirely too small to function satisfactorily. The extended coastline of the commonwealth, 1,979 miles, with the wealth and variety of the fisheries involved, is entirely too great a problem for nine wardens to handle; particularly, when not equipped with boats and therefore confined to land patrol. The fisheries themselves suffer from this inadequate patrol because no extensive conservation program can be carried out without proper supervision. At a time when there is need to develop every natural resource to the fullest extent to combat the great industrial depression, intelligent protection by the State becomes virtually a necessity. Although in the face of actual privation of the citizens every resource should be mobilized to effect relief, this should be accomplished only after due consideration, and promiscuously "letting down the bars" is not a part of wisdom, nor will it furnish more than temporary relief which in the future may create conditions that will decidedly offset the temporary advantages. The Supervisor has consistently supported every intelligent effort to assist local fishermen which has come from proper officials and has originated various moves to assist them, but he desires to point out that, to carry out properly these temporary relief measures, more thorough supervision is necessary and to do this a larger warden force is needed.

The special commission to survey and revise the laws relating to marine fish and fisheries, of which the Supervisor is a member, found the laws very complex and was accordingly granted an extension of time by the



General Court. After lengthy hearings and sessions it has now completed its report in which it has advocated some very decided changes in the present laws.

A revival of interest by the towns in their shellfish areas has been stimulated by the Supervisor. Among the towns which have planted seed clams and quahaugs may be mentioned Newbury, Rowley, Essex, Gloucester, Chatham, Yarmouth, Barnstable, Bourne, Fairhaven, and Nantucket. Private plantings of seed have also been made in Eastham, Orleans, Brewster, and Duxbury. Many towns have been encouraged to close areas of natural set. Special mention of such action may be made of the town of Dennis. In all of these towns very good results have already been observed. In Essex seed clams averaging one and three-eighths inches in length, planted on April 15 of this year, had in many instances reached a three-inch length by November 30.

It is gratifying to note the increased activity of the lobstermen's associations and their tendency to concentrate on certain conservation objectives. These organizations can be made to be of great educational advantage in encouraging among the fishermen greater respect for conservation programs.

*Estimated Value of Fishery Products of Massachusetts, 1931*

Vessel landings at port of Boston	\$ 8,154,311
Vessel landings at port of Gloucester	842,022
Vessel landings at ports of New Bedford and Woods Hole	577,522
Shipped direct to New York	770,030
Shore net and pound fishery	28,856
Lobster fishery	622,776
Soft shell clam fishery	1,920,000
Quahaug fishery	825,000
Shallow water scallop fishery	600,000
Sea scallop fishery	205,000
Oyster fishery	120,000
Razor clam fishery	25,500
Sea crab fishery	105,000
Bait worm fishery	49,215
Sea moss fishery	4,680

Total estimate of Massachusetts fisheries	\$ 14,849,912
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In addition to the fishery products listed above and taken from Massachusetts' waters, there were shipped into the state the following fishery products:

Lobsters from Canada	7,345,825 lbs., valued at	\$ 2,203,747
Lobsters from other states	1,689,426 lbs., valued at	506,827
Total Lobsters	9,035,251 lbs., valued at	\$ 2,710,574
Clams from Nova Scotia	37,954 bus., valued at	75,908
Total of Extra-State Shipments		\$ 2,786,482
Grand Total of Fisheries Products		\$ 17,636,394

*Enforcement of Marine Fisheries Laws*

As in the preceding years nine coastal wardens were employed on the mainland to enforce the laws relating to marine fisheries and shellfish. On the islands of Marthas Vineyard and Nantucket the local inland wardens were used. In addition to these, 61 deputy wardens were appointed to work under the regular wardens and assigned to special work. It was very gratifying to have funds to increase the paid warden force for a few weeks in the late summer and early fall. In this way it was possible to do considerably better work at these times and if this work could have



been extended over a greater length of time the advantages would have been greatly increased.

Ever since the creation of the office of Supervisor of Marine Fisheries, this section has stressed the need of boats in order to adequately enforce the marine fisheries laws. Although no funds were provided to purchase boats, this past summer a small amount was made available for hiring them. This was made more imperative by the passage of laws prohibiting trawling in certain areas, the enforcement of which was placed under the Supervisor. Five different districts were authorized to secure boats during the season when needed. In the few months that this was done the expense was amply justified. Approximately \$500 in excess of the operating cost was taken in fines. A careful record of the work done on one of these boats is as follows: number of miles travelled, 4,000; number of hours aboard, 720; number of fishing boats examined, 132; number of fishermen inspected, 200; number of violations observed and prosecuted, 38; number of egg lobsters liberated in suitable water, 1,550. In addition, the fact of patrol resulted in more than 50 additional lobster licenses being taken out in that district and the number of short lobsters actually observed to have been thrown over on its approach is estimated as more than 1,800. The number thrown over when the boat was at a distance was even greater. Furthermore, reliable fishermen have reported more small lobsters in this area than for a great many years and it is believed this was brought about by patrolling the lobster grounds and thus preventing an extensive use of "shorts."

The court work for the year was as follows: — number of cases entered, 338; convictions, 311; discharged, 17; filed, 64; appealed, 8; placed on probation, 34; jail sentences, 6; the amount of fines imposed, \$4,394.

The following classification is made of cases brought into court:

<i>Nature of Offense</i>	<i>Number</i>	<i>Fine</i>
Taking shellfish from contaminated areas	187	\$2,215.
Clams — 153 cases; fines \$1,835		
Quahaugs — 20 cases; fines \$200		
Scallops — 14 cases; fines \$180		
Possessing undersized shellfish	71	486.
Clams — 32 cases; fines \$278		
Quahaugs — 28 cases; fines \$115		
Scallops — 11 cases; fines \$93		
Violation of lobster laws	56	1,307.
Short lobsters — 38 cases; fines \$1,112		
Without license — 13 cases; fine \$95		
Unmarked buoys — 4 cases; fines \$50		
Possessing punched lobster — 1 case; fine \$50		
Violation of scallop laws	7	65.
Opening on board a boat — 3 cases; fines \$15		
Taking in closed season — 3 cases; fines \$25		
Over 10 bushels — 1 case; fine \$25		
Dragging in restricted areas	9	175.
Torching herring	6	140.
Taking over ½ bu. clams without permit	2	6.
<b>TOTAL</b>	<b>338</b>	<b>\$4,394.</b>

#### THE DEEP SEA FISHERIES.

##### *Cape Cod*

The fishing season off Cape Cod viewed as a whole, was considerably better than in other sections of the state. The entire catch was only a little less than the previous year although prices were very low.

The following comparison is made with the catch of 1930:

##### FISH:

Cod. — About the same abundance and of good size. Prices, lower.

Mackerel — Catch about the same. Plenty of small fish. Prices, lower.  
 Herring — Very few in the spring run. Fall catch better than average.  
 Only a small catch of bluebacks. Prices, same.  
 Butterfish — An increase in catch. Prices, lower.  
 Whiting — More plentiful. Prices, very low.  
 Dogfish — Very few.  
 Squid — Very poor catch. Prices, higher.  
 Flounders — Spring run, good. Fall run, poor. Fish were of good size. Prices, low.  
 Bluefish — Decrease in catch. Prices, lower.  
 Bonita — Fair catch, increase over last year. Prices about same.  
 Haddock — Decrease in catch. Prices, slightly higher.

#### SHELLFISH:

Clams — In fair amount, about same as last year. Scattering sets obtained. Good prospects for coming year. Over 150 bbls. of seed planted.  
 Quahaugs — Beds in good condition. A good general set. Prices, very low. Good prospects for next year. 130 bbls. of seed planted.  
 Razor Clams — Beds in good condition and a very good set. Quantity and prices better than last year.  
 Scallops — 1930-31 season very good. Prices, fair. Fall and winter of 1931, quantity fair. Very good set of seed. Prices lower.  
 Sea Scallops — In very good abundance. Prices so low boats did not fish regularly.  
 Lobsters — In less abundance generally. A greatly increased number of short lobsters.

#### *Buzzards Bay*

Hand line fishing was conducted with good success in Buzzards Bay. Fair quantities of tautog were taken. Scup were in good abundance and of large size. Bluefish were more plentiful than last year but were difficult to catch because of the abundance of natural food. The average size of these fish was larger and there were a few very large ones — one weighing a little over 12 pounds. Other kinds of fish were found in very small numbers. Dogfish were unusually scarce. A few large squeteague were caught. Prices for all fish were very low.

At the two principal ports, Woods Hole and New Bedford, receipts of fish were slightly more than last year. New Bedford seemed to fare better than Woods Hole, particularly in amount of shellfish, due mostly to the nearness of good markets. Both the common bay scallop and the sea scallop are received at New Bedford in large quantities. The amount of mackerel and swordfish also continues to increase each year.

#### *Martha's Vineyard*

There was a general scarcity of all fish around Martha's Vineyard the only exceptions being bluefish and mackerel. The large number of foggy days was partly responsible for this result. Due to southern competition prices were low and demand slight. It is interesting to note that bluefish were very plentiful at the east end of the island and of large size, while both the amount and size of these fish were considerably less at the western end.

Reporting on fisheries of the island and comparing with previous years it is found:

At eastern end:

Haddock — Very few. Size good. Prices, better than last year.  
 Flounders — Less in amount. Price, lower.  
 Yellowtails — Fewer. Price, lower.  
 Scup — Same quantity. Large size. Price, low.  
 Striped Bass — About 1/10 of 1930 catch. Size, very large.



Bluefish — Very plentiful. Average size 4 to 5 pounds, about 1 lb. larger than last year.

Mackerel — Plenty but fewer taken. Immense quantities of small ones remaining up to the first of December.

Cod — Very few. Same as last year.

Squid — Very marked decrease.

Clams — Practically gone.

Quahaugs — Average amount. A small natural set. Prices, very low.

Scallops — About same as last year. Price, low.

At western end:

Haddock — Very few.

Flounders — About the same. Price, lower.

Yellowtails — Catch same as last year. Price, lower.

Scup — Very much scarcer. Price, very low.

Striped Bass — A few more caught than in 1930. Some weighed as much as 52 lbs.

Butterfish — Plentiful.

Bluefish — Not so many. Prices, poor. Fish somewhat smaller—2 to 5 lbs. average.

Mackerel — Catch much better. Fish were of large size.

Cod — Scarcer. Size, fair, same as last year.

Swordfish — A few less caught.

Tautog — Same quantity as last year.

Tuna (horse mackerel) — Catch better than 1930. Weighed from 75 to 500 lbs.

Clams — Almost extinct but general growth and condition good.

Quahaugs — Large increase and abundance of natural set. Prices, very low.

Scallops — Less in amount. Prices, very low.

Lobsters — A little less abundant than in 1930.

### *Nantucket*

The fishing season at Nantucket was very poor. A comparison of the catch of the principal fish with that of 1930 is as follows: flounders, about one-third less; swordfish, very few brought in; mackerel, a slight decrease; cod fish, about 50% less; yellowtails, 40% less; bluefish, more caught, many about 9 lbs., some around 18 lbs.; striped bass, not so many taken, average weight 16 lbs.; clams, very few; quahaugs, an increase.

An increasing amount of fish and shellfish is taken by local boats direct to the market and it is therefore quite difficult to get correct figures. The following account was secured from records of the Steamship Company and from statements by captains of fishing boats and shippers.

Fish by steamer	1,659,400 lbs.
Fish direct	4,500,000 lbs.
Quahaugs	11,486 bbls.
Scallops	19,289 gals.
Conchs	75 bbls.

Estimated value: fish, \$186,702; quahaugs, \$48,241; scallops, \$58,753; conchs, \$262; total value, \$293,958.

Reporting further on the shellfish situation at Nantucket, it may be noted that in addition to a fair natural set, 55 barrels of seed quahaugs were planted by the town. There was a good set of scallops which are quite large and unless weather conditions are adverse there should be a good catch in 1932.

### *Port of Boston*

As will be observed in the records of fish landed at the Port of Boston for the year ending November 30 as given in the appended table, there was a decrease in the total landed catch from the Vessel Fishery of more



than twenty-three per cent from that of 1930. The decrease was principally in the amount of haddock, mackerel, and swordfish. The catch of codfish, halibut, and cusk remained about the same, and in the catch of pollock there was a noticeable increase. The total decrease in the catch was in excess of sixty-six million pounds, of which loss fifty million pounds was in the amount of haddock, which showed a decrease of approximately thirty per cent although it still maintains its undisputed supremacy in quantity landed. Swordfish received from this fleet fell off almost exactly fifty per cent. Although the landings of mackerel showed a considerable decrease (fifteen per cent), there seemed to be more than the usual number of these fish off our shores, but the schools were very much scattered, probably due to the large number of bluefish and porpoises. The immense quantities of very small mackerel in the late fall look promising for the future supply.

Although this decrease is a matter of grave concern to the industry and has been the cause of considerable discussion, it should not be received with too much alarm. An average of the annual total catch of this fishery for the past ten years is, in round numbers, 173,000,000 pounds, and for the amount of haddock during this period, 89,000,000 pounds. Comparing the catch of this year with these averages it would seem that the results could be interpreted as merely a seasonal fluctuation such as quite frequently occurs in any fishery and for which a variety of circumstances might be responsible. The only rational course, however, is to make a careful analysis of the catches as is now being done by the United States Bureau of Fisheries and in the meantime consider if there are not some wasteful practices carried on by the industry which are putting too much of a burden on the normal supply. Among the several quite obvious practices which must be considered very wasteful, the greatest prominence must be given to taking quantities of fish too small to be used economically but upon which the future supply depends. This loss is occasioned by the very efficient trawl nets which allow nothing to escape. The United States Bureau of Fisheries is at present testing a new trawl-net bag designed to allow these immature fish to escape, which gives considerable promise of being quite successful.

Another problem deserving careful consideration is the effect of the disturbance of the bottom feeding grounds by the continual dragging of the large boats day and night. This affects not only the character of the bottom itself but also results in keeping the schools of fish scattered. No satisfactory remedy for this has at the present time been suggested.

One hopeful sign among the facts as reported is the immense shoals of small haddock and cod just under scrod size which have been observed and also the large quantities of small mackerel in the late fall. An unusual feature of the mackerel season of 1931 was the presence of considerable schools of mackerel off Thatchers Island as late as November 30, when this report closes.

We take pleasure in presenting for another year the following comment and resume on the activities at the Boston Fish Pier by Mr. F. F. Dimick, Secretary of the Boston Fish Bureau.

"The year 1931 has been very unsatisfactory not only for the producer but for the dealer. This has been ascribed in a large measure to the low prices that have prevailed for all food products. The scarcity of fish on the fishing banks has been discouraging to the producer and some of the boats were laid up for a large part of the year. As will be seen from the figures that follow, the catch of most all kinds of fish, especially the great staples in this market,—haddock, mackerel, and swordfish—shows a decline. This comes after a period of prosperity in the production, merchandizing and distribution of fish such as had never been experienced before in the history of the fish business. For nine years previous, each succeeding year showed an increase in the receipts from the fishing fleet. In view of the scarcity of these fish on the fishing grounds during the past

year, an investigation along scientific lines is being carried on at present by the Bureau of Fisheries. An investigation of this kind has never been conducted before and the results are awaited with interest.

"The spring mackerel fleet was about the same size as in the previous year. Nights favorable for seining came early in April and the first seiners sailed southward on April 1. The first mackerel were landed at Cape May on April 9 by the schooner *St. Rita*, Captain Frank Favaloro, and were caught eighty miles south of Cape May breakwater. The catch amounted to thirty barrels, mostly of spike mackerel, but it also contained some large fish. Some of these shipped to Boston were sold to the wholesale dealers at twenty-eight dollars per barrel. About a week later catches of large mackerel were landed by the southern fleet. The catch by the fleet up to June 1 amounted to 5,900,000 pounds or about 2,000,000 pounds less than the previous year. The first of June a small fleet was engaged in mackerel fishing on the Cape shore. The first arrival, June 6, had a catch of 65,000 pounds of fresh and 8 barrels of slivered salt-mackerel. This was three days earlier than the first arrival last year. On July 7, the schooner *Antonio* arrived with 94,350 pounds, which was one of the biggest catches of mackerel ever landed at Boston. 'Tack' mackerel—fish weighing two or three to the pound and considered to be fish of last year's brood—were quite plentiful along the coast during the summer. They were about nine inches in length and their presence along the shore augurs well for the success of the fishery next year. The entire mackerel fleet operated chiefly on the coast of Maine from Sequin to Mt. Desert where the mackerel were more abundant than they had been for a good many years. The mackerel seiners landed many good catches of both large and medium fish during the month of August. A few thousand barrels were salted when the demand for mackerel was light, but, generally speaking, very few mackerel were salted by the fishing fleet.

"The catch of mackerel to December 1 amounted to 36,354,266 pounds compared with 42,796,629 pounds to the corresponding date in the year 1930.

"Swordfish were in light supply from the fishing fleet. The first part of the season the weather was bad and when this improved the fish were scarce. The first arrival this season was the schooner *Liberty* with twenty-six fish on July 11. This was two days earlier than the first arrival of the previous year. The fish averaged 169 pounds each and sold at forty-two cents per pound. This vessel had fished on George's Banks and had been out two weeks. It is unusual for a vessel engaged in this fishery to bring in a small fish, but on September 2 the schooner *Dacia* landed a swordfish that weighed only seven and one-quarter pounds. The smallest one on record weighed seven pounds and was landed by the schooner *Anna* in 1922. Very little is known in regard to the spawning of swordfish, but quite a number of small fish have been observed in the Mediterranean Sea in the vicinity of Sicily and it is thought that they breed in that locality. The schooner *Amelia M. Periera* arrived on September 17 with a fish that weighed 644 pounds. This was one of the largest fish ever landed here. It was thirteen feet long and the sword measured forty-four inches. During the fall several hundred thousand pounds of swordfish were received in this market from Japan. They came direct from Japan by steamer and the more recent arrivals were in very good condition.

"Steamers from Japan also brought in cuttle fish which are used principally by the Italian trade. In the past these have been imported mostly from European countries but the receipts from Japan can be sold at much lower prices. The fish were quite uniform in size, weighing about one-half pound each.

"Moderate catches of halibut were landed by the halibut fleet which was fishing in the Atlantic. The first catch of the season was landed by the schooner *Oretha F. Spinney* on February 17, five days later than the



first landing of the previous season. It consisted of 50,000 pounds of halibut from St. Pierre Bank. The first catch of the previous season was from Grand Bank and consisted of 35,000 pounds.

"In the month of August arrivals from the fishing fleet reported seeing large numbers of dead fish floating on the surface in South Channel and off Nantucket. An investigation conducted by the steamer Albatross of the United States Bureau of Fisheries found no unusual conditions and the cause of the death of these millions of fish remains a mystery.

"A new fishery for Massachusetts vessels has been developed in the south in the vicinity of the Virginia Capes. This fishery is carried on in the winter and consists in dragging for sea bass, scup, flounders, butterfish and sea trout. The catch is landed at Cape May and other southern ports. It is engaged in largely by vessels employed in the mackerel seine fishery in the summer. The fleet numbered about fifteen this past winter, but it is estimated that there will be twenty-two vessels so employed this coming winter.

"The receipts of lobsters at Boston from Canada up to December 1 were about ten per cent less than at the corresponding date last year. The first arrival from Nova Scotia shipment of eighty-four crates, came in the month of March and sold at \$40.00 per crate. In 1930 the first arrival was forty-five crates and sold at \$60.00 per crate."

The number of vessels engaged in the various branches of the fisheries that landed fish at Boston for the past five years was as follows:

	1927	1928	1929	1930	1931
Draggers (large and small) . . . . .	166	182	198	202	182
Steamers . . . . .	25	41	60	69	62
Line vessels (hand liners and trawls) . . . . .	105	72	66	82	69
Swordfish . . . . .	79	79	76	87	67
Mackerel . . . . .	102	113	103	112	107
Halibut . . . . .	20	23	17	18	19
Total . . . . .	497	510	520	570	506

RECEIPTS OF FISH AT BOSTON DIRECT FROM THE FISHING FLEET FOR A PERIOD OF FIVE YEARS ENDING NOVEMBER 30, 1931

	1927 (Pounds)	1928 (Pounds)	1929 (Pounds)	1930 (Pounds)	1931 (Pounds)
Large Codfish . . . . .	29,894,368	24,426,905	23,576,163	23,834,885	24,441,043
Market Codfish . . . . .	10,738,328	15,406,558	15,786,557	26,499,149	25,620,020
Cod Scrod . . . . .	113,885	87,890	280,386	169,980	223,786
Haddock . . . . .	97,014,734	121,587,472	153,624,371	160,665,853	108,324,792
Scrod Haddock . . . . .	14,608,529	12,143,585	9,647,206	8,209,927	9,710,768
Hake . . . . .	3,485,099	5,663,183	10,567,876	13,764,080	6,304,425
Small Hake . . . . .	8,835	73,000	3,420	81,530	15,120
Pollock . . . . .	3,419,300	2,954,785	4,286,822	4,821,757	5,070,640
Cusk . . . . .	2,288,056	1,560,014	2,170,200	3,819,348	3,343,296
Halibut . . . . .	4,112,746	3,286,376	2,609,119	2,499,011	2,374,232
Mackerel . . . . .	20,091,120	15,114,960	21,232,279	23,606,198	19,908,792
Swordfish . . . . .	2,141,082	2,263,437	4,096,085	3,078,088	1,531,952
Miscellaneous . . . . .	9,114,389	8,106,759	11,675,599	14,297,200	11,954,828
Total . . . . .	197,030,471	212,674,924	259,556,083	285,347,006	218,823,694

### Gloucester

The catch of fish by Gloucester vessels must be considered, from almost any angle, as very unsatisfactory. Fish were scarce and prices low. The total landed catch of fresh fish from the vessel fishery fell off approximately 65%—from 44,000,000 lbs. in round numbers in 1930 to 15,000,000 lbs. this year. The receipts of salted fish were very little better falling off about 45% from the previous year. Weather conditions were very poor throughout the season and considerable fog and unfavorable winds



were encountered in almost every month. Mackerel, while very plentiful, were "very wild" and catches were generally quite light. In the late fall some very good catches of mackerel were made about 25 miles southeast of Eastern Point where they were schooling unusually late. In this area 330,000 lbs. were landed by the netters in two days in the middle of November. Good catches of pollock were also made in the late fall.

The following table gives the landing of American fishing vessels at Gloucester as reported by the United States Bureau of Fisheries. In addition to the amount of fish listed in this table a considerable amount was landed in Gloucester from other sources and of which there is no accurate record.

*Table of Landings by American Fishing Vessels at Gloucester, 1931*

	Pounds
Cod, fresh:	
Large	4,665,547
Market	900,062
Scrod	11,525
Cod, salted:	
Large	1,028,832
Market	201,532
Scrod	5,645
Haddock, fresh:	
Large	2,420,600
Scrod	203,110
Haddock, salted	810
Hake, fresh	723,595
Hake, salted	5,100
Pollock, fresh	2,379,408
Pollock, salted	1,262
Cusk, fresh	141,245
Cusk, salted	4,805
Halibut, fresh	55,432
Halibut, salted	245
Mackerel, fresh	3,570,471
Mackerel, salted	52,329
Flounders	505,005
Swordfish	10,620
Other, fresh	344,150
Other, salted	1,441,368
Total, fresh, 15,930,770 lbs., valued at \$746,310	
Total, salted, 2,741,928 lbs., valued at \$ 95,712	
GRAND TOTAL, 18,672,698 lbs., valued at \$842,022	

#### SHORE FISHERIES

##### *Shore Net and Pound Fisheries*

According to reports of the shore net and pound fisheries as required by section 148, chapter 130 of the General Laws: number of men engaged, 89; number of boats, 56; value of boats, \$17,935; number of fish pounds, 28; value of fish pounds, \$33,350; number of nets, 56; value of nets, \$1,625; value of shore and accessory property, \$17,672; total catch, 1,248,886 pounds; value of fish, \$28,856.54.

##### *The North Shore*

The fishermen along the north shore were not so hard hit by the generally poor season as were those of other sections. While the clam industry in this area is still somewhat paralyzed by the extensive areas closed because of pollution, the purification plant at Newburyport continued operating throughout the year and did very well. The lobster situation was much improved and the large numbers of shorts and egg lobsters returned to the water augurs well for 1932. Particularly was this true of the areas around Gloucester and Rockport. Line trawlers report a very

fair season. The fish were of large size, but prices were low. The prohibition by law of dragging within the three-mile limit should do very much to revive the line fishing along the north shore.

Alewives and smelt came in more than the usual abundance, especially in the Parker River section. Immense shoals of herring were reported in the late fall in the vicinity of Essex River and they were also quite abundant along the whole shore from Winthrop line to Ipswich. Mackerel were schooling near Thatchers Island as late as November 30 and very good catches were made. Some 330,000 pounds were taken by the netters in two days in the middle of November.

Under Chapter 7, Acts of 1931 the selectmen of Newbury, Rowley, and Georgetown were given authority to grant permits to citizens of their towns to take striped bass with bowed nets in Parker River and its tributaries from February 1 to April 1, 1931. Eighty-two permits were granted and a total of 8,791 pounds were taken between February 1 and March 7 when the softening of the ice prevented further fishing.

### *The South Shore*

Along the shore line south of Boston, commercial fishing, viewed as a whole, was below the average of the past few years. Lobsters were, however, fairly abundant, and fishermen report them as more plentiful than in the past five years. Particularly was this true of the under size lobsters.

Alewives were present in the usual numbers but the run of smelt was considerably less; in some streams nearly fifty per cent less than the average year.

Clams — A very poor season. Chlorinating plant at Plymouth closed in September, partly from lack of material though mainly from effects of business depression. A revival of interest in planting.

Lobsters — A very good season.

Mackerel — Abundant, particularly those of very small size.

Codfish and Haddock — Considerably below average.

Herring — A very good run. Prices, low.

Razor Clams — A few good beds near Plymouth. Not commercialized to any extent.

### LOBSTER FISHERY

As the preservation of egg-bearing lobsters is a most important item in any conservation program affecting the lobster industry, the department has been making a careful study of the situation and may in the near future make some specific recommendations. Certain facts are, however, very obvious and should be carefully emphasized. For the proper preservation of the eggs, the egg-bearing lobster should be kept out of its natural element as short a time as possible, particularly in very hot or very cold weather and should never be exposed to rain or snow. Punching lobsters is at its best an injurious practice and when carelessly done may result in the subsequent death of the lobsters. Some other method of marking egg lobsters for identification should be adopted and a study is being made of this phase of the subject. The question of the liberation of egg lobsters is quite important. In general it may be considered that egg lobsters should be liberated where caught. The female lobster seeks those areas and bottoms which natural instinct indicates are best for the development of her eggs. Unless and until we can find better methods of protection the wisest course is to leave her unmolested in those very areas where she is found. These facts lend considerable support to the practice of the constantly increasing number of lobstermen who liberate their lobsters immediately upon capture.

A study is also being made of the lobster areas of the state to determine if there are any areas which might be closed for certain months for the protection of the egg lobsters and immature lobsters which frequent them. The Division is receiving considerable assistance in this work from the lobstermen of the State.

As required by Chapter 130, General Laws, it is hereby reported that 1,113 lobster licenses were issued during the fiscal year of 1931. Up to date of issuing this report 1,042 lobstermen out of an active list of 1,066 had sent in reports on the season's catch as required by law. The following tabulation has been made of these reports and covers the period from October 20, 1930 to October 20, 1931.

*1931 Catch of Lobsters in Massachusetts as Reported by Fishermen*

	TOTAL CATCH	CATCH BY COUNTIES							
		Essex	Suffolk	Norfolk	Plymouth	Barnstable	Bristol	Nantucket	Dukes
Number of fishermen listed . . . . .	1,066	319	44	43	238	136	114	24	148
Number of fishermen reporting . . . . .	1,042	314	41	41	226	135	113	24	148
Lobster Catch:									
Number . . . . .	1,665,938	513,985	56,299	82,945	377,122	86,303	119,030	22,570	407,684
Pounds . . . . .	2,134,826	660,499	77,604	115,574	431,318	150,076	169,886	32,944	496,925
Value . . . . .	\$622,776	\$214,848	\$26,262	\$32,195	\$125,012	\$47,511	\$49,971	\$9,214	\$117,763
Number of Egg Lobsters . . . . .	38,748	10,681	1,344	1,174	6,222	5,893	4,257	739	8,440
Lobster Pots:									
Number . . . . .	68,507	17,727	2,606	2,196	11,818	5,069	8,501	1,376	19,214
Value . . . . .	\$216,141	\$52,190	\$7,720	\$7,522	\$46,857	\$15,442	\$26,057	\$5,175	\$55,178
Boats:									
Number . . . . .	1,060	325	36	33	226	154	139	21	126
Value of Boats and Accessories . . . . .	\$377,354	\$83,997	\$10,773	\$11,265	\$73,218	\$43,433	\$44,303	\$18,438	\$91,927
Total Equipment Value . . . . .	\$593,495	\$136,187	\$18,493	\$18,787	\$120,075	\$58,875	\$70,360	\$23,613	\$147,105



Late in the summer through the courtesy of one of the large cold storage companies, a small space was given the Supervisor on one of the wharves in Boston Harbor, with facilities for experimenting on the tank system of keeping lobsters. Although the season was too far advanced to any more than start this work, some progress has been made. A large number of short lobsters which had been seized from international shipments were revived by this method of handling and were liberated in very much better condition than could otherwise have been done.

As authorized by law an expenditure of \$8,883.00 was made for the purchase of egg-bearing lobsters caught in Massachusetts waters. A total of 10,231 lobsters were thus purchased, punched in conformity with law and liberated as nearly as possible in the localities where taken. In certain localities fishermen prefer to punch and liberate the egg lobsters at the time of capture. 28,517 were reported as thus liberated without expense to the State. In addition to the above a total of 652 egg-bearing lobsters were seized from shipments received from outside of the state and liberated in the waters of the Commonwealth. Egg lobsters were liberated by the state in the various areas as follows: North Shore, 1,304; Vicinity of Boston, 359; South shore, 167; Cape Section, 1,517; Nantucket Sound, 1,165; Buzzards Bay and Vineyard Sound, 6,371.

From international shipments a total of 21,637 live short lobsters were seized and liberated in widely scattered areas. Good reports have been received from areas stocked with shorts last year. Lobstermen reporting that the lobsters had grown very rapidly and that many weighed as much as a pound and a half after their first shedding.

### THE MOLLUSK FISHERIES

CLAM. — Pollution and the problems connected with the contaminated areas still continue to be the chief ones confronting the soft shell clam industry of the Commonwealth. The laws regulating this subject are in need of revision and in fact are being considered by the Commission on Revision of Marine Fisheries Laws. While some small areas were opened by the Department of Public Health often for only a few months, our previous estimate still holds true that approximately \$2,500,000 worth of clams are contained in the contaminated areas of the State, of which amount \$1,500,000 worth is in Essex County alone.

This year there were three purification plants in operation. The total amount of clams treated by the three purification plants was 56,626 $\frac{1}{4}$  bushels and valued at \$113,252. The Newburyport chlorinating plant operated the entire year, treating clams taken from Newburyport and Salisbury areas. An average of 52 men were employed each working day and these dug 43,813 $\frac{1}{2}$  bushels from approximately 67 acres of flats. The greater part of these clams were shucked and sold as open stock. The chlorinating plant at Scituate operated over a period of five months and used clams taken from the contaminated areas of Boston, Hingham, Hull, Weymouth and Provincetown. A total of 2,796 $\frac{3}{4}$  bushels were treated at this plant. At Plymouth the Pioneer Fisheries Company ran intermittently over a period of ten months. 10,016 bushels were treated mostly from polluted areas in Hingham, although some were taken from Plymouth, Quincy and Weymouth. The total area estimated to have been dug over for the three chlorinating plants was approximately 75 acres. While the areas selected were undoubtedly the best in those localities, a very good idea can be obtained from this data as to the vast amount of clams within the entire contaminated area, particularly when it is recalled that Essex County alone has more than 3,000 acres of productive clam flats in its polluted areas.

It is impossible to accurately determine the total amount of clams dug in Massachusetts this year, but it is estimated that in addition to the amount taken by the purification plants there were more than 600,000 bushels of clams taken from Massachusetts shores. The total value of the

soft shell clam industry of Massachusetts in 1931 is therefore estimated at \$1,920,000.

**SCALLOP.** — The scallop season ending April 1, was slightly above that of 1930 with prices averaging about \$3.50 per gallon and weather conditions were very favorable for the fishermen. There was a particularly heavy catch of scallops made at Edgartown. A total output of 180,500 gallons was secured for the entire State, which is valued at \$600,000, a decrease of about \$67,000 from 1930 value. The present season, beginning October 1, gives every indication of equalling the output of the previous year but the prices are much lower. At the present writing, Nantucket seems to have the greatest supply with good quantities in Edgartown and Chatham. Abundant sets have appeared in Fairhaven, Cataumet, Brewster, and Falmouth. The growth on both adults and seed scallops is very much better than average. Except for severe winter storms there are encouraging prospects for the next season's supply. Starfish are becoming a greater menace each year to the scallop industry. This condition must be seriously considered and intelligently combatted or the abundant sets of the present year will be greatly depleted.

**RAZOR CLAMS.** — In the town of Barnstable the beds of razor clams, or razor fish as they are locally known, were reported as in excellent condition, and again there was a heavy set. Some sixty men were employed in digging this shellfish in this town, and a total of 1,800 barrels was secured. Razor clams were also found in quantity in Yarmouth, Wellfleet, Dennis, Brewster, Eastham, Duxbury and Plymouth but are not commercialized to any extent in these towns. Small scattering beds are found in Revere and other bars of Boston Bay which are exposed at extreme low tides. In all of these beds there seems to have been a very good set. The principal use made of razor clams in this State still continues to be for bait, although, through the efforts of the Supervisor, a growing market as food is being encouraged. The value of the total output of razor clams this year is figured at \$25,500, of which amount \$13,495.50 was reported by the shellfish officer of Barnstable.

**QUAHAUG.** — There was a splendid set of quahaugs in many areas of the State. A particularly heavy one occurred at the western end of Martha's Vineyard, and very good sets in Mashpee, Falmouth and Barnstable County generally. Prices were much lower than they have been in years and there was little demand. The effort of the Supervisor in encouraging local planting of seed quahaugs is bearing fruit, and with favorable winter conditions results will be noticeable in 1932. There was an apparent shrinkage of \$150,000 in the value of the quahaug fishery in this State in 1931 when compared with that of 1930. The estimated value of the quahaug output was \$825,000.

**OYSTER.** — The oyster industry of the Commonwealth this year suffered principally from competition from the underselling from other more productive states, and the demand for the firmer and more select grade of local stock was consequently not so good. There was a falling off in actual business amounting to approximately 40% from 1930 figures. A very heavy set of oysters occurred at Wellfleet and a very good set on the Cape and in Buzzards Bay. Here again the local trade was handicapped by the poor demand for seed oysters, due to heavy sets occurring elsewhere. Growth of oysters and general condition of stock in the beds were very good. Starfish constituted a very great and increasing menace to oyster beds particularly in the Buzzards Bay section. The estimated value of this year's output of oysters is placed at \$120,000.00 as compared with \$170,000 estimated for 1930.

**SEA SCALLOPS.** — There was a good supply of sea scallops reported by the boats from Provincetown and Wellfleet, and a fair supply in the beds off Nantucket. Prices were very low, however, and in consequence there was a decrease of about 25% in amount brought in. A total amount of 100,000 gallons is estimated to have been taken at a value of \$200,000.



**SHELLFISH PERMITS.**—A total of 977 shellfish permits were issued by the Supervisor in 1931 classified as follows: to dig clams from the contaminated areas for the purification plants, 588; to take clams and mussels from the contaminated areas for bait purposes, 130; to transplant quahaugs from the polluted area to clean areas, 197; to take scallops from the polluted area at a certain season, 26; to take shellfish less than two inches in length for transplanting, 35. The total amount of shellfish salvaged under these permits exclusive of shellfish used as bait was reported as follows: clams, 56,626 bushels; seed clams, 840 bushels; quahaugs, 8,295 bushels; seed quahaugs, 879 bushels; little necks, 6,896 bushels. Permission was also given to salvaged scallops washed up by the storm at Wauwinet Beach, Nantucket. More than 1,000 bushels were taken into deeper water from this shore. The total value of shellfish salvaged under permits is conservatively estimated, even at the present very low prices, at \$439,567.

#### ALEWIFE

There was considerable increase in the run of alewives in nearly every stream in which this fishery occurs but prices were very low. Due to the efforts of the Supervisor a great many more fish were enabled to reach the upper spawning grounds than in many years past and the interest in the alewife fisheries has thereby been greatly increased. The estimate of the year's commercial alewife fishery in Massachusetts for the present year was 3,600 barrels valued at \$10,500. An amount greater than this was taken for family use.

#### FISHWAYS

##### *The Parker River Fishways*

The spring run of alewives, smelt and other anadromous fish in the vicinity of Parker River, was awaited with considerable interest this year in order to observe the efficiency of the new fishways in that stream. These were completed late in 1930 and consist of a series of five fishways built over obstructions in this river from its mouth to the flood gates of Pentucket Pond, Georgetown—a distance of twelve miles of stream. The fishways proved to be unusually successful. Many thousand of fish passed through as far as Pentucket Pond and a large number of these were lifted in nets over this obstruction by employees of this department and interested local residents. About five and a half to six days were required for individual schools to pass through all the fishways. Alewives, white perch, yellow perch and black bass were observed using them frequently. One report was received that a few shad were seen, but no smelt. These latter fish seemed to have been content to spawn on the rocky bottom outside of the No. 1 fishway.

The run of alewives in this stream began on April 18th and continued to June 15th. The heaviest part of the run occurred from May 1 to June 7 and was particularly heavy from May 17 to 21 and again from May 26 to 31. During this last period the fish were, at times, going through the fishways faster than one could count them. Many of the alewives entering the fishways were so ripe that they spawned soon after passing the No. 1 fishway. In the latter part of October and first part of November quantities of young alewives, from 3½ to 4½ inches in length, were seen going back to the sea. One young alewife was caught by hook line in Pentucket Pond in the early fall. As a result of such a large number of fish reaching the spawning grounds a very heavy run of alewives may be expected in 1933 and 1934. A sum of \$755.35 was expended this year on the Parker River fishways, for the additional reinforcement of certain walls and for adjustments necessary to put the fishways in proper operating condition.

##### *Other Fishways*

All fishways in the marine section were inspected by the coastal wardens in their respective districts. Minor repairs, such as replacement of baffles



and cleaning out debris, were taken care of by the wardens. Especial attention was directed to the Taunton River system where certain fishways were not functioning properly. After some temporary adjustments were made a considerable quantity of alewives ascended the streams to points not reached before in many years. A small appropriation is available for continuing this work in the spring of 1932. In compliance with chapter 174 of the Acts of 1918 it is hereby reported that no expenditure was made for the maintenance of the fishways at Lawrence and Lowell, which are in good condition.

#### SEA CRAB INDUSTRY

This year, sea crabs were found in practically all areas in the State in which they are sought, in slightly increased abundance and larger in size than in 1930. There were not so many taken, however, because the demand for crab meat was considerably less. This was due to the large amount shipped in from southern and also Japanese markets. The total output of crabmeat in Massachusetts was approximately 150,000 pounds with a market value of \$105,000. In addition to Boston which is the principal center of the industry there were small crab fisheries carried on this past year in Beverly, Gloucester, Lynn and Ipswich. Fifty-four crab licenses were issued.

#### BAIT WORM INDUSTRY

In direct contrast to other branches of the fisheries the bait worm industry was in a very thriving condition. There were approximately 150 men employed in digging the two species of worms for which there is demand. The entire eastern coastline of this state was combed for suitable places and for a time the Massachusetts diggers were compelled to operate in Maine. Areas close to Boston, however, proved the most remunerative. It is estimated that more than five million bait worms were marketed by this group of men this past season, and the value may be set, conservatively, at \$49,215.

#### SEA MOSS

A somewhat waning industry, the gathering of sea moss, is still pursued in Scituate, and this past year some 15 men were employed intermittently. 78,000 lbs. of moss were harvested, valued at \$4,680.

#### ACTIVITIES OF U. S. BUREAU OF FISHERIES IN MASSACHUSETTS

The research activities of the U. S. Bureau of Fisheries along the coast of Massachusetts were quite extensive this year. Its statistical branch was particularly active and is well equipped to provide the fishing industry with sound and often-times advance information on the abundance of the commercial fishes. This work is deeply appreciated.

We take pleasure in quoting a resumé of the work of the Bureau by Commissioner Henry O'Malley.

"The marine fishery investigations pursued along the Massachusetts coast in 1931 by the Bureau of Fisheries were chiefly concerned with the cod, haddock, mackerel, and flounder. There were other investigations conducted in neighboring states, which occasionally took in small areas of Massachusetts coastal waters. Chief among these were the shore fisheries investigations on squeteague, scup, and butterfish and the investigations on the propagation of oysters. These two were conducted in the waters of the State south and west of Cape Cod.

"This investigation on the cod was nearing completion, and a small amount of supplemental tagging was done on Nantucket Shoals to add to the large amount of information already existing on the seasonal and spawning migrations of this fish. During the last week in July the fisheries research steamer *Albatross II* made a survey in the deeper parts of the Gulf of Maine to learn by the use of the otter trawl what species of fish live in those parts of the Gulf where commercial fishing is seldom done, and to learn especially whether important food fishes were to be found there.

"In the fall of 1930, the bureau undertook an investigation of the haddock fisheries, the most important fishery of the New England area. This fishery is subject to considerable fluctuations in yield, and recent evidences of decline in abundance, coupled with a tremendous expansion of the industry as a result of the packaged fish business, have given rise to fears of serious depletion in the fishery. A comprehensive plan of investigation in the interest of conservation and the proper development of the resource involving studies of changes in abundance of the stock and the possibilities of serious depletion has been adopted, but such studies require considerable time for the production of results of practical value. Nevertheless, one phase of the investigation already has yielded results which promise to have signal value to the industry. A new type of savings trawl\* has been developed to permit the escape of virtually all fish below commercial size limits (under 1½ lbs.) without reducing the catch of marketable fish. If this is adopted by the fishing industry, it should not only accomplish material economies in operation of the fishing vessels, but should be a positive factor in the conservation of the stock of fish in the sea. In order to secure a more concise and distinct picture of the past history of the fishery, the records of many years were secured from various sources and were compiled and condensed for greater ease of comparison.

"In the furtherance of the program as above outlined, a number of cruises were made on Georges Bank and the continental shelf of Massachusetts by the *U. S. F. S. Albatross II*, beginning in February and extending through August, to learn of the seasonal changes in the biological and physical factors affecting the production of new stocks of fish with particular reference to the haddock.

"Although most of the strictly biological work on the life history of the mackerel was done on material collected in other sections of the coast, most of the statistical data from which the study of annual fluctuations in yield will be conducted was secured by the Bureau's agents in Massachusetts. The chief aim of this work is to determine variations in abundance of mackerel and their causes so that reliable predictions of commercial yields can be issued for the benefit of the industry.

"In the southern part of the state, particularly in Nantucket Sound, many individuals of the commercial species of flounders were tagged in an effort to learn more of their migrations. This is the part of an investigation in which the main areas concerned are the waters of the more southerly coast states."

Through the courtesy of the superintendents of the Marine Fish Hatcheries of the U. S. Bureau of Fisheries at Woods Hole and Gloucester, we are pleased to report the following numbers of marine fish fry and fish eggs released by the Bureau in Massachusetts waters during the calendar year of 1931. "Green Eggs" represent eggs which were taken from fish caught by commercial fisheries. These eggs were carefully fertilized and released on the fishing grounds.

\* It will be of interest to note that since this resume by the commissioner the above mentioned trawl has proven quite satisfactory in tests made in Massachusetts waters and there now remains only a few minor adjustments to be made before presenting it to the commercial fishermen.

SPECIES	Eggs Taken	RELEASED			Station
		Green Eggs	Eyed Eggs	Fry	
Cod . . . . .	63,452,000	-	-	15,532,000	Woods Hole
Cod . . . . .	244,203,000	133,482,000	-	85,204,000	Gloucester
Haddock . . . . .	264,954,000	212,795,000	-	33,487,000	Gloucester
Mackerel . . . . .	12,050,000	-	1,611,000	8,580,000	Woods Hole
Pollock . . . . .	146,331,000	-	-	86,776,000	Gloucester
Winter Flounder . . . . .	1,340,476,000	100,000,000	138,840,000	917,139,000	Woods Hole
Winter Flounder . . . . .	276,562,000	-	-	252,615,000	Gloucester
	2,348,028,000	446,277,000	140,451,000	1,399,333,000	



## COLD STORAGE WAREHOUSES

A comparison of the amount of fish placed and held in the freezers in succeeding years is a valuable index to the relative abundance of the fish taken, since it must be considered that this amount is either in excess of market demands or was occasioned by unfavorable prices. This year is accordingly found, as might have been expected, a decrease of 25% in the total poundage received at the warehouses. According to the records of the Department of Public Health there was, from December 15, 1930 to November 15, 1931, a total of 39,613,204 pounds placed in cold storage in the twenty warehouses licensed to receive them. In the same period of the previous year there was a total of 52,954,729 pounds. The principal decrease was in the amount of ground fish (cod, pollock, haddock) which shrunk nearly 50%; the amount of squid decreased from 4,226,610 pounds to 1,390,424 pounds; whiting, 10% decrease; miscellaneous fish fell off nearly 50%. On the other hand the amount of butterfish, never a very large item, was nearly doubled while mackerel, herring and halibut remained nearly the same. Mackerel was the species in greatest abundance with whiting a close second. The amount of fish on hand in the freezers varied from 7,271,714 pounds on April 15 to 22,276,116 pounds on October 15.

## BOUNTY ON SEALS

The following towns were reimbursed by the Commonwealth (through the county treasuries) for bounties paid on 270 seals in accordance with Section 155, Chapter 130, General Laws: Yarmouth, \$278; Rowley, \$6; Provincetown, \$6; Duxbury, \$32; Ipswich, \$108; Kingston, \$68; Essex, \$22; Barnstable, \$4; Plymouth, \$4; Hingham, \$2; Newburyport, \$2; Revere, \$2; Rockport, \$2; Salem, \$2; Winthrop, \$2; fees to treasurers \$135. Total \$675.

## NOTE OF APPRECIATION

Sincere appreciation is expressed for the very courteous assistance received from many sources during the preparation of this report on the marine fisheries, with special mention of the cooperation of the United States Commissioner of Fisheries Henry O'Malley and his assistants; the Boston Fish Bureau; Massachusetts Fisheries Association; and the Massachusetts Shellfish Association.

The Director acknowledges his indebtedness to Arthur L. Millett, State Inspector of Fish, Zenas A. Howes, State Supervisor of Marine Fisheries, and Earnest W. Barnes, biologist of the marine fisheries section, for their assistance in preparing that part of the report pertaining to marine fisheries.

Respectfully submitted,

RAYMOND J. KENNEY

*Director of Fisheries and Game*



**The Commonwealth of Massachusetts**

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**ANNUAL REPORT**

OF THE

**Division of Fisheries and Game**

FOR THE

YEAR ENDING NOVEMBER 30, 1932

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*Mass.* DEPARTMENT OF CONSERVATION *Division of*

[OFFICES: 20 SOMERSET STREET, BOSTON.]



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## DEPARTMENT OF CONSERVATION

*Commissioner*, WILLIAM A. L. BAZELEY, Uxbridge

### DIVISION OF FISHERIES AND GAME

20 Somerset Street, Boston, Mass.

Director, RAYMOND J. KENNEY, Belmont.

Chief Fish and Game Warden, CARL G. BATES, Natick.

Fish and Game Warden Supervisor, (Propagation) FORREST S. CLARK, Holden.

Fish and Game Warden Supervisor, (Law Enforcement), LLOYD M. WALKER, Shrewsbury.

Biologist and Supervisor of Distributions, J. ARTHUR KITSON, Boston.

Supervisor of Fish and Game Permits and Claims, ORRIN C. BOURNE, Melrose.

State Inspector of Fish, ARTHUR L. MILLETT, Gloucester.

State Supervisor of Marine Fisheries, ZENAS A. HOWES, Quincy.

Biologist and Statistician—Marine Fisheries, EARNEST W. BARNES, Roslindale.

Head Clerk, MISS L. B. RIMBACH, Medford.



# The Commonwealth of Massachusetts

## ANNUAL REPORT

The Director of the Division of Fisheries and Game herewith presents the sixty-seventh annual report.

### GENERAL CONSIDERATIONS

Recognizing the rising public demand for a decrease in the cost of government the Division has bent its every effort during the year to accomplish this purpose. The details of these accomplishments will be found, under proper headings, throughout the report.

The decreased size of this report is in keeping with this policy, and much of the material heretofore included in the report has been omitted in order that the statute whereby only a brief summary of the year's work is required, could be strictly complied with. The material heretofore printed in the report is available at the headquarters of the Division for those who are particularly interested in those subjects.

Starting on the basis of an appropriation of approximately \$24,000 less than that for the fiscal year 1931, the Division has continued its work without the curtailment of its activities.

The entire work of the Division has been divided into seven distinct bureaus, and the various activities have been reallocated to place each within the scope of the proper bureau. The effects of this reorganization have already become apparent, but the results in later years in increased efficiency and economy are likely to be impressive.

The propagation and distribution of fish and game has been kept abreast of previous years, and the following pages of the report will indicate that in some cases the distribution has surpassed that of any past year.

A new policy was established whereby no additional land will be purchased until all of the present game farms and fish hatcheries have been brought to a point of maximum production, as it appears inadvisable to increase the overhead of any branch of the propagation work until full returns can be obtained from the plants now in operation. For all practical purposes five of the six fish hatcheries have been developed to their capacity, and development work will be concentrated on the sixth hatchery during the coming year to compass the same result. At least two of the game farms have possibilities of expansion if that becomes advisable.

Despite every effort to cut the operating cost of the Division, sufficient money has been spent on repairs and replacements to offset depreciation and maintain the lands and buildings in proper condition.

The economies effected have not only offset the decreased appropriation, but have resulted in a substantial saving of money which has been applied to the purchase of fish and game from private breeders. From the private game farms throughout the State there were purchased 2,703 pheasants, the total number of privately reared birds meeting the biologist's requirements as to quality, that could be located in the State. This represented the purchase of the entire surplus output of this industry. In a like manner, a total of 212,000 fish were purchased from the commercial fish hatcheries. In some cases the entire surplus of the hatchery was purchased and distributed in suitable waters.

Thus the Division has gone through a year in which the loss of revenue has been considerable, with a record of accomplishments surpassing that of previous years. In addition, it has contributed its small share toward the assistance of private business in the Commonwealth by using funds derived from economic readjustments of the work, for the purchase of

fish and game which would otherwise find no market. This has resulted in a stabilization of the private propagation of fish and game in the State, and is a direct benefit to the sportsmen whose funds are used in the conduct of this work, as more fish and game has been liberated in the waters and covers of the State than ever before in the history of the Division.

The limited scope of the work which available funds will allow the Division to do in the field of marine fisheries has not made it possible to effect the same amount of savings in that branch of the work. Nevertheless, every effort has been made during the year to secure the best possible results from the funds provided for the marine fisheries activities, and no effort will be spared in the future to secure a high degree of efficiency in that work regardless of the amount of money available to finance it. The marine fishing industry has felt the reaction of the worldwide economic disturbance, and wherever possible the Division has lent its aid to assist in restoring the century-old and valuable industry. To that end the Division will continue its every effort.

### PERSONNEL

The outstanding change in the personnel of the Division was brought about through a desire to increase efficiency in the propagation and distribution of fish and game. Heretofore it was customary for the Director to personally supervise the operation of the four game farms and six fish hatcheries, in addition to the general direction of the many other activities of the Division. It became apparent during the year that it was physically impossible for a Director to give the necessary supervision to this work and at the same time carry out the other functions placed upon that office by the statutes. In the distribution section of this report will be found a discussion of the change in the distribution policies, whereby all of the distribution work is at present carried on by the warden force.

These two factors resulted in the assignment of Fish and Game Warden Supervisor Forrest S. Clark to a new position covering the supervision of propagation work at the fish hatcheries and game farms and the distribution of stock throughout the State. The operation of the fish hatcheries and game farms, together with the actual distribution work which is to be done by the wardens, will, in the future, be under the personal direction of Supervisor Clark. By reason of this change while the biological section will continue to lay out a general distribution program, based upon its increasing knowledge of the biological conditions throughout the State through its survey work (recorded elsewhere), the actual distribution work will be carried on by Supervisor Clark and the warden force.

This readjustment will relieve the Director of the incidental details in connection with the operation of the fish hatcheries and game farms, resulting in more time for the general activities of the Division, particularly those relating to marine fisheries, and at the same time will make it possible to standardize the practices at these plants, which should result in a reduction of the overhead expense as time goes on.

Warden Lloyd M. Walker of Maynard was appointed, provisionally, as Fish and Game Warden Supervisor to succeed Supervisor Clark in the direct charge of the warden force in the field.

No addition was made to the warden force as a result of this change, as the position of warden-at-large was abolished and Warden Henry M. Parlee was assigned to the Maynard district left vacant by the promotion of Warden Walker.

Upon the establishment of an eligible list for the position of "Field Agent, Division of Fisheries and Game," the provisional employment of William L. Osterhout in that position was discontinued, and Arnold E. Howard of Lowell, was appointed permanently to the position as of February 1.



## FINANCES

The revenue of the Division, as shown in the following tables was materially reduced during the fiscal year as compared with that preceding. The greatest item of loss was in the sale of sporting and trapping licenses, which showed a net reduction of \$20,164.10. This was undoubtedly the direct effect of the economic conditions which existed during the year. For the same reason the revenue received from the prosecution of fish and game law violators was reduced by \$2,936.95 under 1931, despite the fact that the warden force prosecuted more cases than in the preceding fiscal year. The financial condition of many of the defendants compelled the courts to suspend the fines or place the defendants on probation, with the above result.

Under the provisions of Chapter 272, Acts of 1932, a new license statute will become effective on January 1, 1933. This statute will eliminate the sporting licenses which have been in effect for the past seven years, and will restore the system of separate hunting and fishing licenses. It will further provide a uniform rate for non-resident hunters or fishermen to replace the present sliding or reciprocal fee which has been a source of much confusion during the past few years, and has resulted in an unfair tax upon many of the non-resident visitors.

It is difficult to forecast the effect of this new license system upon the revenue of the Division, but it is evident that there will be a further drop in revenue unless the separation of the licenses will result in increased sales. Nevertheless the legislation has brought about a worthwhile change in the license system, and has reestablished it upon a fair basis which is likely to meet with popular approval.

The new scale of prices is as follows: For resident citizens—sporting, \$3.25; hunting \$2; fishing, \$2; minors between the ages of fifteen and eighteen, and women, fishing only, \$1.25; trapping, \$5.25; minor trapping, \$2.25. No charge to a person over seventy. Non-resident citizens—sporting, \$15.25; hunting, \$10.25; fishing \$5.25, minors between the ages of fifteen and eighteen, fishing only, \$2.25; trapping, \$15.25. For non-residents owning real estate in Massachusetts assessed for taxation at not less than \$1,000, members of any club or association incorporated for the purpose of hunting, fishing, or trapping (provided the corporation owns land in Massachusetts equal in value to \$1,000 for each member), the fees will be the same as for resident citizens.



## APPROPRIATIONS AND EXPENDITURES

	Appropriations	Balances, transfers	Expenditures	Balances to 1933	Balances to State Treasury
<b>Part I (Revenue for 1931, \$308,633.94)</b>					
Salary of the Director	\$4,500.00	-	\$4,500.00	-	-
Office Assistants, Personal Services	15,140.00	-	14,987.18	-	152.82
Office Expenses	14,105.00	\$143.93	13,311.40	\$416.50	521.03
Education and Publicity	1,000.00	-	963.63	-	36.37
Enforcement of Laws:					
Personal Services	73,010.00	-	71,987.81	-	1,022.19
Expenses	38,345.00	200.82	32,135.58	107.50	6,302.74
Biological Work:					
Personal Services	9,300.00	-	9,130.11	-	169.89
Expenses	1,925.00	1,026.35	2,949.50	-	1.85
Propagation of Game Birds, etc.	130,880.00	504.12	128,434.20	-	2,949.92
Special: for Improvements and additions at Fish Hatcheries and Game Farms	15,095.00	5,517.18	13,882.66	6,729.52	-
Damages by Wild Deer and Wild Moose	5,700.00	-	5,578.80	-	121.20
Establishment and Maintenance of Public Fishing and Hunting Grounds	-	23,567.38	11,743.89	11,823.49	-
<b>Part II (Revenue for 1931, \$45.00)</b>					
Protection of Wild Life	2,400.00	-	2,379.95	-	20.05
<b>Part III (Revenue for 1931, \$9,073.70)</b>					
Marine Fisheries:					
Sale and Cold Storage of Fresh Food Fish	17,100.00	24.57	17,032.86	-	91.71
State Supervisor of Marine Fisheries:					
Personal Services	8,700.00	-	8,698.50	-	1.50
Expenses	4,600.00	292.36	3,945.40	475.00	471.96
Enforcement of laws relative to Shellfish, etc.					
Personal Services	17,545.00	-	17,533.00	-	12.00
Expenses	10,700.00	43.21	10,530.78	-	212.43
Purchase of Lobsters	9,500.00	181.77	5,992.60	-	3,689.17
Purchase of a Boat	3,500.00	-	3,500.00	-	-
Improvements on Fishways	-	140.00	137.30	-	2.70
Fishways on Parker River	-	25.38	6.03	-	19.35
Extermination of Starfish, etc.	15,000.00	-	8,711.20	6,288.80	-
	<b>\$398,045.00</b>	<b>\$31,667.07</b>	<b>\$388,072.38</b>	<b>\$25,840.81</b>	<b>\$15,798.88</b>

## REVENUE

Following is the revenue accruing to the State Treasury for the period of the fiscal year, from the activities of this Division.

	Part I Produced by the hunters, anglers and trappers	Part II Produced by those who en- joy wild life but do not hunt, fish or trap	Part III Produced by the marine fisheries
<b>Part I</b>			
Sporting and trapping licenses (\$276,558.30 less \$288.00 refunded on account of overpayments in 1931, less \$26 invalid check, and less \$50 overpayment in 1932)	\$276,193.50		
Rent, sales, etc., at stations	512 00		
Sale of shiner permits	420.00		
Sale of game tags	85.10		
Sale of confiscated goods	94.50		
Sale of miscellaneous goods; miscellaneous items	48.25		
Sale of gunning stand permits	932.25		
Fines turned into State Treasury as a result of inland fish and game law violations	7,800 00		
<b>Part II</b>			
Nothing		Nothing	
<b>Part III</b>			
Lobster license fees			\$5,490.20
Crab meat license fees			315.25
Sale of lobster meat permits			670.00
Sale of lobster rules			9.25
Lease of clam flats			15.00
Miscellaneous sales			1.00
Fines turned into State Treasury as a result of marine fisheries violations			2,582.80
<b>Total Revenue, \$295,169.10</b>	<b>\$286,085.60</b>	<b>Nothing</b>	<b>\$9,083.50</b>

## DETAIL OF RECEIPTS FROM SPORTING, TRAPPING AND LOBSTER LICENSES

	Total number issued	Gross value	Fees to clerks	Net Return to State
Resident Citizen Sporting (\$2.75)	102,101	\$280,773.25	\$25,345.75	\$255,427.50
Resident Citizen Trapping (\$5.25)	451	2,364.75	112.25	2,252.50
Non-resident Citizen Sporting (\$10.25 and upwards)	471	6,843.25	116.75	6,726.50
Non-resident Citizen Trapping (\$10.25)	2	20.50	.50	20.00
Non-resident Citizen Sporting (\$3.25 and upwards)	1,065	5,203.05	263.75	4,939.30
Non-resident Citizen Trapping (\$5.25)	1	5.25	.25	5.00
Alien Sporting (\$15.25)	1185	2,821.25	46.00	2,775.25
Alien Trapping (\$15.25)	3	45.75	.75	45.00
Minor Trapping (\$1.25)	513	637.25	127.75	509.50
Minor Sporting (fishing only \$1.25)	3,210	4,012.50	799.25	3,213.25
Duplicate Licenses (50c.)	1,289	644.50	—	644.50
Resident Citizen Sporting (Free)	5,065	—	—	—
Totals, sporting and trapping licenses	\$114,356	\$303,371.30	\$26,513.00	\$276,558.30
Deduct overpayments (on account of 1931 licenses, \$288.80; on account of 1932 licenses \$50.00; invalid check, \$26)				364.80
				\$276,193.50
Resident Citizen Lobster (\$5.00)	1,120	\$5,600.00	\$168.00	\$5,432.00
Non-resident Citizen Lobster (\$5.00)	12	60.00	1.80	58.20
Resident Citizen Crab (\$5.00)	65	325.00	9.75	315.25
<b>Totals, marine licenses</b>	<b>1,197</b>	<b>\$5,985.00</b>	<b>\$179.55</b>	<b>\$5,805.45</b>

A considerable increase is noted in the number of licenses sold at the office of the Division, as it becomes more generally known that licenses may be issued there. The increased sales represent not only the sportsmen's appreciation of the added convenience, but also their desire to give the Division the advantage of saving the 25c issuance fee.

## CONVENTIONS AND MEETINGS

Director Raymond J. Kenney attended the following meetings: Eighteenth American Game Conference, in New York City, December 1 and 2, 1931.

Advisory Council: Marine Section, January 14; inland section, January 22. Business at these meetings was confined to a discussion of State-wide conservation policies.

Director Kenney attended the meeting of the New England Game Conference, held under the auspices of the Massachusetts Fish and Game Association at Boston, January 23. He presented a paper, "Laying the Foundation for Wild Life Administration in Massachusetts."

New England Fish and Game Commissioners' Association, January 23. This was the first meeting of the association, which was formed during the New England Game Conference with Director Kenney elected as Secretary. Its purposes, as set forth in the by-laws, are "the vigorous promotion of cooperative efforts between the several New England States and the Commissioners or Commissions thereof in breeding, feeding and protecting fish and game in New England" and "it shall also promote cooperation between the United States Bureau of Biological Survey and the United States Bureau of Fisheries and the several New England States." The second meeting was held at Hartford, Conn. March 26. This meeting confined itself largely to a discussion of plans for uniting the New England states in an effort to secure a satisfactory modification of federal migratory bird regulations. The third meeting was held in New York City on November 29, during the session of the American Game Conference. At this meeting plans were discussed for the New England Game Conference, to be held in Boston early next year, and the general fish and game conditions throughout the New England states were canvassed by the commissions.

Hearing before the Senate Committee on Wild Life Conservation at Washington, D. C. April 4-6, at which time and place the Director represented the several New England states and presented a brief on the migratory bird conditions in New England and recommendations for the regulations to be applied to migratory birds for this section of the country. (For a more complete account, see Water Fowl).

International Association of Game, Fish and Conservation Commissioners September 19-20, and American Fisheries Society September 21-22 at Baltimore, Md. At these meetings Director Kenney read papers entitled, "Combination Licenses versus Separate Licenses," and "Combating the Starfish Menace on Massachusetts Shellfish Grounds."

American Game Conference, held under the auspices of the American Game Protective Association in New York, November 28-30. This is the one annual conference in the country that brings together the heads of the State divisions and others interested in the wild life resources of the nation. Director Kenney presented a paper, "How to provide Public Fishing Waters."

A number of meetings of fish and game clubs throughout the State were attended, giving preference to the County League meetings, all of which were visited at least once during the year. Local clubs were visited as far as time would permit.

## ACTIVITIES OF STATE AND LOCAL ORGANIZATIONS

The Council of Sportsmen's Clubs of Massachusetts held meetings at Worcester January 3; at Greenfield May 8; and at Bryantville October 2.

The fish and game organizations of the State, despite the fact that they have had the backing of only a small proportion of the licensed hunters and fishermen in the State, have been of great benefit to the Division in carrying out certain functions. The county leagues have cooperated to the fullest extent in holding meetings for county-wide surveys upon



which the distribution of fish and game is based in accordance with the details given under Fish and Game Distribution.

The local fish and game clubs have assisted in the actual distribution of the fish and birds, and this cooperation has been greatly appreciated.

The decreasing revenue of the Division, together with the increasing demands of the hunters and fishermen, makes it self-evident that the Division alone cannot do all the things which are necessary to maintain good hunting and fishing conditions in the State. The sportsmen, through wider and more active organization, must take up independent lines of conservation work if the desired results are to be obtained. It is not sufficient that the sportsmen's associations content themselves with the mere distribution of the stock raised by the Division. The Division is now supplied with the man-power and equipment necessary to do this distribution work, which will release the sportsmen's organizations to engage in independent, worth-while conservation projects. To aid in bringing this situation about the Director submitted proposals of projects which the local clubs and the county leagues might well undertake as their contributions to the wild life conservation program of the State.

The following matters of county-wide scope were suggested to the County Leagues:

1. To watch the game situation so as to furnish accurate information in case scarcity of grouse or quail should raise the question of suspending or modifying the open seasons, or bag limits, under the new law authorizing such action by the Director.
2. To cooperate with land owners and fruit growers in a survey of the deer in the four western counties, so as to give definite facts in case the Director is requested to declare a second week of deer hunting.
3. To confer with county commissioners with a view to bringing about a better enforcement of the dog laws, so that the trained hunting dogs may be absolved from the blame for the damage done by self-hunting, homeless dogs.
4. To secure from riparian land owners along feeder streams which it is desired to close for the conservation of small trout, their consent for the Director to take this action under the new law.
5. Work out a plan to annually close one-third of the ponds in each county to winter fishing for a two-year period, thus leaving one-third of the ponds open at all times.
6. To interest Congressmen in securing as much of the output of the Federal hatcheries as possible, to supplement the State-raised fish.
7. By cooperation with their respective county Farm Bureaus to bring about closer contact between the sportsmen and the land owners.
8. To plan the purchase of fish and game in quantities, so that better prices can be secured than individual clubs could buy it, for their special stocking programs.
9. To make exhibits at county fairs, which limited appropriations prevents the Division from doing.
10. To appoint sub-committees within the County Leagues for the purpose of rectifying a condition of which non-members sportsmen complain, namely, that the clubs devote their attention to one or two classes of sport and neglect other branches.

The following suggestions were made to the local club:

1. Organize and advertise a definite program as a means for increasing membership; elect officials and delegates of ability having leisure to serve, and support them to the limit. Have periods in club meetings for reports by members on important conservation matters assigned them for study, followed by general discussion, thus educating the whole membership in conservation problems.

2. A program of education of —*Sportsmen*, to necessity of courtesy to land owners, and of following the ethics of hunting and fishing rather than pursuit of bag limits only; *General public*, to their ownership of the wild life resources and their obligation to bear the cost of its protection by assuming the expense, in whole or in part, of maintaining the law-enforcement organization of the Division; and *Children*—the men and women of tomorrow—to conservation problems.

3. A program to convince the land owners that they may safely remove their posters and allow sportsmen to hunt and fish on their property. This can be best accomplished by an example of the conduct of the sportsmen in open lands, and by a committee of the club organized to repair damages by thoughtless hunters and fishermen.

4. Winter feeding of wild stock, including not only distribution of grain in severe weather but planting (with permission of land owners) small patches of grain to stand through the winter for bird feed and shelter.

5. Program to provide that rights of way be laid out for access to great ponds in the respective districts not now open to public fishing; consideration of a program to annually close one-third of the ponds in the county each year to winter fishing for a two-year period; prevention of pollution, and removal of obstructions and debris.

6. Systematic study of methods of keeping vermin in reasonable control.

7. Inducing water boards to allow the Division to transfer fish from their reservoirs to open waters; and authorities in charge of closed public lands to allow the trapping and redistribution of surplus game, and to practice vermin control.

8. Unceasing work to prevent forest fires; cooperation with fire enforcement officials; and reforestation work.

9. Support of the State wardens in law enforcement work and prompt reports of the names of all violators; assist the Division in securing honest reports of game killed by giving publicity to the importance of these reports; and advise legislators of club wishes in regard to legislation.

10. Supplement State activity by raising fish and game for liberation.

Undoubtedly many organizations went forward with plans along the lines suggested, but up to the present time the Division has received no definite report of their progress.

#### EDUCATION AND PUBLICITY

In addition to the publicity work carried on by the Supervisor of Permits and Claims, the Division maintains a monthly press service to the newspapers of the State. Each month, except in summer, some phase of the Division's activities is selected on the basis of the timeliness of the subject, and a statement is prepared in newspaper form and sent to every paper in the State. The majority accept and print these releases verbatim, and through the kindly cooperation of the press the people of the State have had a better opportunity to visualize the functions of the Division and to learn how its work affects them, directly or indirectly, in some phase of their individual interests. The value of these monthly releases has been also attested by requests from newspapers outside of the State, that they be supplied with the material which is sent to the domestic papers. The articles this year covered the following subjects:

Work of the State Supervisor of Marine Fisheries.  
Public Fishing and Hunting Grounds.  
Work of the State Inspector of Fish.



New Policy in the distribution of fish and game raised at the State hatcheries.

Trout season, and the distribution of food and game fish to public waters.

Statistics of game and fur taken by licensed hunters and trappers.

A new method of testing lobsters apparently dead.

New laws and amendments enacted by this year's legislature.

Seasons and regulations for the hunting season about to open.

Summary of the year's fish and game distribution.

The radio has come to be a factor in the Division's publicity work, and several broadcasts have been made over local stations. At the request of the Massachusetts Industrial Commission the Director spoke on its series of broadcasts over Station WNAC in Boston, addressing the radio audience on the Recreational Advantages of Massachusetts. Through the courtesy of the management of Station WAAB he gave other broadcasts, notably "Arbor Day" (which included preservation of the Commonwealth's forests and its song and insectivorous birds), and "The Lure of Autumn Days in Massachusetts Fields and Woodlands."

#### ACKNOWLEDGEMENTS

Gifts, and balances of previous ones, are reported—

##### *Sutton State Fish Hatchery Fund (formerly Merrill Pond System Fund)*

The \$129.25 brought over from last year, and a donation this year of \$50 from the Nipmuc Rod and Gun Club, were used (with other funds) to purchase land held under lease from Grace E. Sullivan.

A donation of \$25 from the Asneconic Pond Association was used in reconstruction of trout ponds.

##### *Montague State Fish Hatchery Fund*

The \$49.50 brought over from last year was used to construct dams.

A donation of \$100 from the Dighton Fish and Game Club was used for labor on a new pond.

##### *Sunderland State Fish Hatchery Fund (formerly Amherst Fish Hatchery Fund)*

The \$307.25 brought over from last year was used (with other funds) to purchase land from Fish Culturist in charge, Louis Horst.

##### *Other Gifts*

Acknowledgment is made of the gift of 5,000 eight-inch trout from the Tehanto Club of Pocasset.

A gift of \$25 from the Massachusetts Fish and Game Association for repair of roads in the Boxford Sanctuary, is on hand at the close of the year.

Interest accumulated on the Trust Fund over a period of years, amounting to \$159.18, was spent at the Sutton State Fish Hatchery for general improvements about the ponds.

#### ENFORCEMENT OF LAWS

The personnel of the law enforcement branch of the Division has undergone little in the way of change during the year.

Warden Daniel C. Durrum resigned as of January 15 and Warden Leon E. Myatt was transferred from the Taunton district to fill the vacancy. On April 1 Cyril W. Hanley of Newburyport was appointed and assigned to the Taunton district.



Fish and Game Warden Supervisor Forrest S. Clark was relieved from active charge of field work and assigned to have oversight of the fish hatcheries and game farms and the distribution of stock. He retains, however, his rank in the law enforcement service, at times will perform active duty with the warden force, and will retain his headquarters at Holden.

Warden Lloyd M. Walker of Maynard succeeded him in the supervision of the field force, with headquarters at Shrewsbury.

Warden Peter P. Monahan of Westfield retired on October 8 by reason of disability brought about through an accident on May 20, after twenty-one years of active service. Mr James E. Noble of Westfield fills the vacancy provisionally.

The district court work for the year was as follows: number of cases prosecuted, 1,348; district court convictions, 1,261 (of which 377 were filed and 17 appealed to the Superior Court; discharged, 87; fines imposed in district courts, \$13,642. In addition to the penalty imposed by the court, the sporting or trapping license of the person convicted becomes void, and no license can be legally secured until after one year from the date of conviction. Economic conditions continue to be a factor in the disposition of cases, resulting in many cases being placed on file due to the inability of the defendants to raise money to pay the fines. Nevertheless, a number of outstanding cases resulted in the payment of substantial fines.

During the past year the carcasses of deer which came into the Division's possession (either by accidental or illegal killing) were disposed of through the local welfare boards, which supplied the wardens with lists of needy families. The venison was distributed in amounts varying with the size of the families. In this way 110 families have been furnished with meat—often the first meat of any description they had in many days.

The work in general followed along as in other years, with certain classes of violations resulting in more severe penalization than the ordinary violation. There were 35 cases of aliens found with firearms in their possession, resulting in fines totalling \$860. One important bird netting case in North Adams cost three defendants \$120 each. Illegal deer hunting came in for a fair share of outstanding work on the part of the wardens, resulting in fines of from fifty to one hundred dollars. The total fines for this class of violation were \$950.

The case testing the constitutionality of the so-called humane trapping act, which it was not possible to record completely in last year's report, has been brought to a conclusion. The Supreme Court upheld the constitutionality of this law, with the result that the defendant was fined fifty dollars upon one complaint.

The work of the deputy wardens (greatly reduced in number) has shown a marked improvement, with the result that they have made a record for this branch of the service. It had been evident for some time that the work of the deputy warden (unpaid) branch of the service left much to be desired, and at the annual warden meeting a new policy was inaugurated to make this service comparable with that of the regular wardens.

Heretofore deputy wardens had been appointed with little thought concerning their adaptability for the work or their knowledge of the responsibilities involved. They, through no fault of their own, knew nothing of the duties of an officer nor of the rights of the public, consequently incidents have occurred that reflected on the warden service as a whole. It was decided that the deputy wardens be required to measure up to the standards of the regular force as to entrance age, height and weight, and, further, to pass an examination composed of questions dealing directly with the fish and game laws, or related matters. When the appointments were renewed at the beginning of the year, all men who could not devote time to this work were dropped, together with others who for one reason or another did not observe the rules of the service. This reduced

the deputy warden force to about one hundred men who, over a period of time, had given satisfaction, and gave each district warden a smaller number of men. With this greatly reduced force, sufficient time was found to train them for the work. It has also given the Division a closer connection with its unpaid force, and to some extent does away with the unsatisfactory condition of a force of men working without any guidance or visible leadership.

Still further benefits are expected to become apparent as times goes on, for from such a force of men, educated and trained within the Division for law enforcement and conservation work, should come men fitted to qualify in civil service examination for appointment to the paid force. If such ready trained men were on the eligible list, prepared to step into vacancies, it would do away with the present slow and costly training of men who enter on the work with no previous experience. It is the desire of the Division to go still further into this matter, which seems important enough to warrant close attention to this branch of the law enforcement agency.

The time is past when the public should be at the mercy of inexperienced officers in this or in any other line of law enforcement. The public is entitled to and deserves the utmost in service and efficiency from the men of this Division, whether they be regular or deputy wardens. Conservation problems do not, as a rule, come within the experience of the average person and the majority are untrained along these lines. Consequently, if this Division is to keep abreast of the demands made upon it, then some such policy as the foregoing must be adopted in the future.

#### NEW LEGISLATION

Following are listed the laws relating to fish and game, enacted during the legislative session of 1932. Some of the changes should work for the betterment of general law enforcement.

Chapter 28—provides for an open season on quail in Norfolk County and gives protection to quail throughout the year in Berkshire and Franklin counties.

Chapter 52—provides for the issuance of permits by the Director to authorize certain persons to kill grouse doing damage to orchards, between December first and April fifteenth following.

Chapter 60—authorizes the Director, after a public hearing and with the approval of the Governor and Council, to suspend or modify the open season or bag limits on ruffed grouse and quail.

Chapter 77—authorizes the Director, with the approval of the Commissioner of Public Health, to salvage certain fish in the Wachusett Reservoir for stocking purposes.

Chapter 78—authorizes the Director, with the approval of the riparian owners or the owners of fishing rights, to establish restricted areas in any unnavigable brook or stream suitable for breeding fish, and make rules and regulations governing these streams.

Chapter 81—removes restrictions so that hunting dogs may be trained at all seasons of the year, provided a permit is obtained from the Director so to do during the close season on the particular game in connection with which the trial is held.

Chapter 82—places beaver under protection, with heavy penalties for its pursuit.

Chapter 180—makes corrections in the general statutes, two of which relate to fish and game, namely—Section 8, which brings the metropolitan district into the area on which fire wardens and fish and game officials are empowered to enforce the forest fire laws; and Section 26, which requires persons trapping animals damaging their property, to observe the provisions of the trapping law even in the formerly exempted area within fifty feet of their dwellings.

Chapter 264—changes the open season on deer from two weeks in the



four western counties and one week in the remainder of the State, to a one-week open season throughout the State (except that Nantucket County remains closed); and authority is given the Director to declare an additional week of open season in Berkshire, Franklin, Hampden and Hampshire counties as conditions warrant.

Chapter 272—abolishes the present system of a straight sporting license and provides for the issuance of separate hunting or fishing, as well as sporting licenses, effective January 1, 1933.

#### RECOMMENDATIONS FOR NEW LEGISLATION

No recommendations are made for changes in the game and inland fish laws.

#### BIOLOGICAL SECTION

On January 5 Mr. Standish Deake of Cambridge was permanently appointed Junior Fish and Game Biologist to the Division.

The work of the year consisted of the handling of general biological and distribution problems and the details and correspondence related thereto, field problems, and the stocking of the inland waters and covers.

The establishment of a biological laboratory at 20 Somerset St., Boston was completed late in November.

The usual routine examination of fish, birds and quadrupeds sent to the Division were made by Dr. David L. Belding of the Boston University School of Medicine, Dr. E. E. Tyzzer and Dr. Hans Theiler of the Harvard Medical School. This opportunity is taken to thank these men for their valued assistance.

During the early months of the year a survey of white hare cover was completed, which will serve as a basis for the proper distribution of hares.

Considerable service was given to the clubs operating rearing pools, such as investigating the causes of losses and recommending the treatment of ponds where trouble had been experienced.

The biologist conducted a series of conferences with the county leagues at which the distribution of stock for the following year was discussed, and the covers and waters to be stocked recorded.

Much work was done at the State hatcheries in the sterilization of pools and buildings against a recurrence of furunculosis. For this work a special apparatus was devised for the use of chlorine gas applied under pressure which caused the mud and stone work to be effectively reached by the disinfecting agent. The effectiveness of this work may be judged by the fact that not a single outbreak was experienced in any of the pools of the hatcheries formerly infected. The eradication of this disease represents the saving of considerable money and fish which otherwise would have been lost.

For the first time in the United States a technique for the disinfection of fish eggs was experimentally developed, and successfully applied to all brook trout eggs purchased, to prevent infection with furunculosis. Detailed description of the experiment carried out, and the method which was developed, will be found in the Appendix.

*Stream Survey*—Pursuant to the intention expressed in the last report, a survey of the trout streams of the State has been started and is well under way. Data of a biological and practical nature have been acquired, supplementing records already on hand, with a view toward organizing a biologically correct stocking policy and the establishment of public fishing grounds. This data consists of a complete report not only on the main stream but on each tributary as well, and includes information as to its desirability as trout water, and the species of trout, or other fish, best adapted to it. Consideration was given to all known factors which influence the stream in question as a favorable trout habitat. Such work is of a pioneering character, and it is expected that it will result in the conservation of the product of the hatcheries and also improve fishing



conditions. In this survey the following streams have been examined and the data concerning them recorded: Westfield River, Squannacook River, Shawsheen River, Konkapot River, North River, Jones River, and Ne-masket River.

A reconnaissance was also made of certain streams to locate possibilities for the establishment of public fishing grounds,—seven such examinations being made in Norfolk County, thirteen in Bristol County, and nineteen in Berkshire County. Of these thirty-nine streams plus the seven in the regular stream survey, only six were found suitable and selected for public fishing grounds. (This subject is discussed fully under "Public Fishing and Hunting Grounds").

## SUPERVISOR OF FISH AND GAME PERMITS AND CLAIMS

To the Supervisor's duties have been added the oversight of Penikese Island Sanctuary, and of the newly established public fishing grounds. Attention to the latter comprised the outstanding feature of the year's work. As there is a special section of the annual report devoted to reservations, a full discussion of the foregoing part of his work will be found under that heading.

### DEER DAMAGE CLAIMS

The appropriation for payment of deer damage claims this year was cut to \$5,700 against \$6,000 last year. The total payments for 106 claims amounted to \$5,578.80. (\$5,416.13 for claims and \$162.67 for supplies). The experiments with tar paper as a means of preventing deer from browsing orchards, commenced last year, gave good results in small, sheltered orchards. In the large orchard, however, there was difficulty in keeping the paper from blowing away as the orchard was located on a hillside open to heavy gales. Experiments here will be continued.

Under Section 108, Chapter 131, General Laws, there were 37 deer shot while damaging crops.

### EXHIBITS AND LECTURES

About the usual number of evening talks were given during the winter before church clubs, schools, women's clubs, Kiwanis, Rotary and Lions Clubs. The two regular exhibits were put on, at the Sportsman's Show in Boston and the Eastern States Exposition in Springfield.

### PERMITS

The sorts of permits which are issued have increased until there are now twenty-one. This year all requests for permits to make private collections of birds have been disapproved, and the permits now in force are being reviewed with the object of cancelling inactive ones. Bird banding permits requested through the U. S. Bureau of Biological Survey have been granted for non-game birds; but requests for permits to band migratory game birds (principally ducks and geese) have been consistently turned down, both because of the opportunities that would be afforded for improper use, and because hunters, particularly gunning stand owners, would be led to believe that banders have special privileges, which they would likewise seek. A few requests for the establishment of private fishing ponds were granted when it was found that the applicants had full control of the waters in question.

## WILD BIRDS AND ANIMALS

### STATISTICS OF GAME AND FUR-BEARING ANIMALS TAKEN

There were 96,513 reports of the game and fur taken during the calendar year 1931 filed by p      asers of 1932 sporting and trapping licenses.

These reports show that of the license holders of 1931, 41,871 took no game or fur (presumably fishermen); 33,214 took game; and 3,778 took fur. 17,650 persons who bought licenses in 1932 held none in 1931. Tabulated, the reports show the amount of game and fur taken to have been—

Gallinules	236
Rails	507
Wilson snipe (Jack snipe)	1,614
Fresh-water coots (mud hens)	1,577
Ducks (including skunk head, butter bill and white winged scoters, commonly known as "coots")	46,260
Geese	3,534
Brant	986
Woodcock	22,311
Quail	12,303
Ruffed grouse	42,499
Pheasants	29,204
Deer (837 bucks; 756 does)	1,593
Cotton-tail rabbits	177,073
White hares	20,548
Gray squirrels	63,573

Total head of game taken	423,818
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Muskrat	24,794
Mink	581
Skunk	5,810
Red Fox	3,676
Gray fox	503
Raccoon	2,461
Weasel	841
Otter	54
Canada lynx (loup cervier; <i>Lynx canadensis canadensis</i> )	5
Bob cat (wild cat or bay lynx; <i>lynx rufus rufus</i> ; not to include wild hunting house cats)	115

Total pieces of fur taken	38,840
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*Water Fowl*.—The wide-spread dissatisfaction with the Federal regulations for the hunting of migratory water fowl during 1931, received the attention of the Division with the result that through cooperation with the other New England states, more satisfactory regulations were obtained this year.

Early in the year the Secretary of Agriculture announced a reorganization of the Advisory Board to the Bureau of Biological Survey, and under the new plan the New England states were entitled to one representative. Through the medium of the New England Fish and Game Commissioners' Association Commissioner George J. Stobie of Maine was unanimously recommended to the Secretary of Agriculture for appointment as the New England representative on the Advisory Board, and Commissioner Stobie was subsequently appointed.

A further development in the water fowl situation took place when the Special Senate Committee on Wild Life Conservation held public hearings in Washington from April 4 to 6, at which time the Director appeared as a representative of Massachusetts and the other New England States, and presented the following brief.

*"Mr. Chairman and Gentlemen of the Committee:*

*"I appear before you today in a dual capacity,—as State Director of Fisheries and Game, acting officially for the Commonwealth of*



Massachusetts, and as Secretary of the New England Fish and Game Commissioners' Association, and appearing by its direction.

The Association held a meeting at the Executive Offices of the State Board of Fisheries and Game at Hartford, Connecticut on March 26 last and discussed at considerable length the migratory bird situation in New England.

It was the consensus of opinion, among the commissioners, that the past regulations of the Bureau of Biological Survey have been unsatisfactory to the sportsmen of New England and have subjected them to unfair discrimination and unnecessary restriction.

*States' Rights.* We feel that more satisfactory results and better cooperation from the public can be obtained if the Congress will return to the respective states the right to regulate the times and methods of taking migratory birds within the limits set by the Federal Government as to the length of open season; the period of the year during which an open season can be declared; and, the bag limits. New England is primarily a flight area, and its problems must be handled, if they are to be handled satisfactorily, on the basis of local conditions. State discretion, we feel, can be granted without doing injustice to any part of the country.

*Supply of Birds.* Our surveys show that there has been a normal supply of our migratory water fowl with the possible exception of those species which are known to breed in the western Canadian provinces. Our supply of native black ducks has been above normal. In Massachusetts, for example, we have received wide-spread complaints of great damage caused by an over-abundance of eider ducks and other diving ducks upon our shellfish areas. We have been confronted with complaints of substantial damage to winter grains on farm lands adjacent to the shore where hundreds of geese have entered and completely destroyed the grain.

*Rest Days.* The majority of the commissioners are opposed to specific rest days each week during the gunning season. They feel that such a plan might increase the number of birds killed in New England, and that it is not true conservation. The owners of private gunning preserves have followed the rest-day principle for years and have found from a practical standpoint, that it results in better shooting and larger kills on the days when shooting is permitted within their respective areas.

*Bag Limits.* The Association voted, as an evidence of good faith, to accept, if necessary, a reduction in bag limits on ducks and believes the sportsmen would be agreeable to a limit of ten ducks per day if a reasonable open season and rational regulations can be secured. When such bag limits are established, it does not seem reasonable or fair that there should be imposed upon us a repetition of the ten-live-geese-decoy regulation of 1931 which is unenforceable and which leads to a general disrespect of other worthwhile and necessary regulations.

*Shooting Hours.* Suggestions were made, at the meeting to which I have previously referred, of further restriction of the shooting hours during each day of the shooting season, but it was unanimously voted to recommend an adherence to the present shooting day from one half hour before sunrise to sunset.

*Length of Season.* It was unanimously voted that our present observations and reports indicate justification for a 60-day open season as the absolute minimum for 1932, but reserving our rights to request a 90-day season if later observations and reports seem to warrant such a request.

*Finances.* The commissioners are aware of the necessity of a sound financial program which will assist the Federal Government in restoring breeding areas and in giving the waterfowl better protection during their migrations and their stay within the United



States. Although no formal vote was taken on the proposed shell tax, many individual opinions were expressed in opposition to the principle. Some believe it to be unwarranted interference by the Federal Government with the domestic affairs of the respective states. Any sound financial program which will provide the necessary funds for the Bureau of Biological Survey to proceed with the restoration of breeding areas and the protection of the migratory water-fowl, will receive our hearty support. But there is a wide-spread feeling that the shell-tax proposal is not the solution to the present financial problems.

*Cooperation of the States.* Every state in New England stands ready to extend to the Federal Government all possible assistance in the protection of the migratory birds. For example, in Massachusetts we have secured the appointment of every state warden as a deputy federal warden, and after considerable difficulty we have secured from the Legislature a reciprocal statute which automatically gives each Federal regulation the force of state law, regardless of how often they are changed within the course of the year. Federal enforcement officers are practically unknown in Massachusetts and the Federal courts are relieved almost entirely of migratory bird cases.

Massachusetts has enacted a stringent law requiring the registration of every permanent shooting blind or stand in the state. It provides that the Director of Fisheries and Game may absolutely close such a stand for a period of one year if, after a hearing, he has reason to believe that any violation of the migratory bird law has been committed by any person within the limits of the premises, regardless of whether or not a conviction has been secured in the state or federal court. These are examples of what the states are doing to enforce the migratory bird laws and what states can do if given the opportunity. We will continue to give this cooperation in Massachusetts and New England, but we object to unjust and unnecessary restrictions upon the gunning of migratory waterfowl when our observations show a normal supply, if not an increase.

*Conclusion.* We want the sovereignty of the respective states recognized and respected in the administration of migratory bird conservation and the right to handle our domestic problems, subject to the general prescription of major policies by federal authority. Constitutionally, all powers and rights not expressly granted to the Federal Government are reserved to the respective states, and to the people. Conservationally, so to speak, it would appear that the inherent rights of the states and the people are recognized in abridgement rather than in observance.

To avoid repetition I have omitted the several matters covered by the other witnesses from Massachusetts. However, I have noted their manuscripts with approval and in their conclusions I heartily concur."

When the Advisory Board later organized at Washington, Commissioner Stobie, with the assistance of representatives from other sections of the country, was able to secure a modification of the 1931 regulations, with the result that Massachusetts was granted a two-month open season from October 16 to December 15, both inclusive, and the heretofore arbitrary regulation concerning the number of live goose decoys to be used for gunning purposes was entirely removed. These two major changes, together with others of minor importance, met with the wide-spread approval of the water fowl gunners of the State, and the sportsmen were exceedingly grateful for the efforts which Commissioner Stobie made in their behalf in connection with obtaining these modifications.

The data collected concerning the gunning stands showed the number of stands licensed to be 311; number of reports received, 270; ducks shot, 18,728; geese shot, 5,987; live duck decoys used, 4,613; wooden duck de-

coys used, 5,889; live goose decoys used, 5,802; wooden goose decoys used, 5,458. In comparing the above figures with those of last year it should be borne in mind that the season last year covered one month against approximately three months in past years.

*Pheasants.*—A continued demand for an open season on hen pheasants resulted in a request by the Director to the Council of Sportsmen's Clubs of Massachusetts for a recommendation in regard to this matter, and at the meeting held in Greenfield on May 8 the Council recommended that the season remain closed on the female birds. The dissatisfaction continued to such an extent that the Director delayed the promulgation of regulations pending the meeting of the above Council on October 2. At that time the Council somewhat reversed its previous position and recommended an open season on hen pheasants in all the mainland counties except the four western counties, and the Director immediately issued regulations in accordance with the recommendation of the Council. Later, on request of the sportsmen of Hampden County, the regulations were amended to allow the shooting of hen pheasants in that county.

*Deer.*—Under the terms of Chapter 264, Acts of 1932 the open season on deer was modified to the extent that the two-week open season in the four western counties was eliminated, and a straight one-week season established throughout the entire State, with the exception of Dukes County. By the terms of this statute the Director was given discretionary power to declare an additional open season of one week in the four western counties if, in his opinion, the situation warranted such action. An investigation disclosed that the land owners and the sportsmen of these counties were apparently satisfied with the statutory season of one week, and for that reason the Director did not exercise his discretionary powers in regard to declaring an additional open season.

The total of deer killed in open season was (for the open season in December of 1931) 1,593 (837 bucks and 756 does), divided among the counties as follows: Barnstable, 154; Berkshire, 372; Bristol, 27; Dukes, none; Essex, 9; Franklin, 302; Hampden, 251; Hampshire, 121; Middlesex, 33; Norfolk, 7; Plymouth, 70; Worcester, 201; locality not reported, 46.

Data on damage by deer is treated in the section covering the work of the Supervisor of Fish and Game Permits and Claims.

*Wild Cat Bounties.*—The record of bounties paid in 1931 on wild cats, inadvertently omitted from the report for that year, is given: Bounties of \$10 each were paid by county treasurers (under Section 133, Chapter 131, General Laws) on 97 wild cats (the bay lynx and the Canada lynx) for which reimbursement was made by the Treasurer of the Commonwealth.

During the present year bounties were thus paid on 102 wild cats.

## RESERVATIONS

### *Martha's Vineyard Reservation*

Evidence appearing that the one surviving heath hen had lived through the winter, Dr. Alfred O. Gross of Bowdoin College, Brunswick, Me., was engaged to make the annual spring check-up. His report follows:—

"The following report of the heath hen situation for the year 1931-32 is made under the auspices of the Massachusetts Division of Fisheries and Game. I made my annual visit to Martha's Vineyard Island March 28 to April 2 in company with three students of ornithology from Bowdoin College. In spite of our best efforts and the excellent co-operation of the state department, as well as that of many volunteer observers stationed in various parts of the heath hen range, we failed to see the heath hen this year.

On April 1, 1931, the last heath hen was trapped on the James Green farm and marked with two metal bands. An aluminum band number 407,-880 was placed on the left leg, and a copper band, number A-634,024,



was fastened to the right tarsus. The bird returned to the vicinity of our blind on the following day apparently none the worse for its experience and continued to visit the traditional "booming or courting" field at regular intervals until May 9, 1931. The bird failed to make its appearance during the remainder of the year. On February 9, 1932, the bird unexpectedly and dramatically appeared at the Green farm after an interval of nine months, to announce to the world that it was still alive. Thereafter it was seen at regular intervals until March 11, 1932, but according to James Green the bird seldom came to the exposed center of the field as it did in the past years and consistently kept itself close to the dense scrub-oak cover. Perhaps a harrowing experience with some predatory hawk or mammal has made this wary creature even more cautious. Mr. Green, owner of the farm, who keeps a constant watch for the famous bird, has not seen him since March 11. Thomas A. Dexter of Edgartown claims to have seen the bird when he passed the Green farm on the morning of April 6, but this report has not been substantiated by a subsequent record.

This "last bird" has been alone since December 8, 1928, and is at least nine years old as there have been no young heath hen since the summer of 1924. The history of the heath hen and the various factors involved in its decline have been fully considered in previous reports, but it will be of interest to those who have not followed the status of this species to review the numbers of birds as recorded in the annual official census reports. The birds were at their height in 1916 as far as their recent history on Martha's Vineyard is concerned. In the early spring of that year over 800 birds were counted and an estimate as high as 2,000 was made by the warden in charge. The following table reveals the rapid decline of the heath hen from 1916 to the present time:

<i>Year</i>	<i>Number of Birds</i>
1916	800
1920	314
1921	117
1922	75
1923	28
1924	17 (Including 3 females. This is the last year when broods of young were observed and reported)
1927 Spring	13 (Including 2 females)
Autumn	7 (All males)
1928 Spring	3 males
Autumn	2 males
December 8	1 male
1929	Lone male studied and photographed during April. Seen on the Green farm until May 11. Appeared again in October and was seen throughout the winter.
1930	Bird again observed and photographed during April and reported on the Green farm until the middle of May and again during the autumn and winter months.
1931	April 1 trapped and banded. Seen at the Green farm until May 9.
1932	February 9. Seen regularly until March 11. April 6 reported as seen on the Green farm. After that date not seen up to the time of this report June 1, 1932.

#### *Proposed Introduction of Prairie Chickens*

As in former years, earnest requests have come from organizations as well as from individual sportsmen and bird lovers to introduce the prairie chicken, a western sub-species, to mate with the closely related heath hen, for practical or purely sentimental reasons. Interest in this experiment was revived on February 23, 1932 when Mr. W. F. Grimmer of the Wisconsin Conservation Department offered to furnish the live prairie chick-



ens and to pay all expenses of transportation to Massachusetts. Mr. Lloyd Taylor and other interested persons of New York generously offered to provide additional funds as might be needed to carry out the experiment. The Martha's Vineyard Rod and Gun Club voted to favor the introduction and the Vineyard Gazette, the local paper of the Island took a decisive stand for the project. In view of the local as well as national interest in the experiment the offers made by the State of Wisconsin and the New York gentlemen were again submitted to the Massachusetts Division of Fisheries and Game. After a thorough consideration of the matter the State Department of Conservation refused to issue a permit for the introduction of the birds. Mr. Raymond J. Kenney, Director of the Division of Fisheries and Game issued the following statement,—

'The Commissioner of Conservation and the Director of the Division of Fisheries and Game have given very careful consideration to the matter of the liberation of western prairie chickens on Martha's Vineyard. They consulted leading ornithologists and sportsmen in Massachusetts and obtained the sentiment of representative citizens of Martha's Vineyard, and majority opinion opposed the experiment. A final decision not to import prairie chickens was made on the basis of the foregoing.'

In connection with the suggested introductions of the prairie chickens the following statement was made in the heath hen report for 1931.

'In the past many attempts were made to introduce the prairie chicken, the close relative of the heath hen, to Pennsylvania and the plains of New Jersey, Long Island, and Massachusetts, including Martha's Vineyard. Although these introductions were made in large numbers and with great care, every one of them resulted in failure. Likewise introductions of the heath hen when these birds were abundant on Martha's Vineyard, made to Long Island and the mainland of Massachusetts, never proved a success. All attempts to rear the birds in captivity failed. It is apparent that pinnated grouse (heath hen and prairie chicken) do not lend themselves to such methods of conservation and are very sensitive to any change in their environment. They are not adaptable and are totally unlike the hardy pheasant, which can be readily transplanted from one part of the country to another. But grant that an introduction of prairie chickens to Martha's Vineyard might be successful, there would be only the remotest chance that the last heath hen would mate successfully with the prairie chickens. One reason of the failure of the heath hen to raise young since 1924, when there were still a number of females present with the males, was the fact that excessive interbreeding had brought about declining sexual vigor and sterility.'

The atrophied sex organs of several males examined in 1925 gives strength to the view that our last heath hen is sterile. Furthermore ornithologists are not interested in a hybrid and the introduction of prairie chickens, a sub-species so similar in appearance to the heath hen, would becloud and obscure the final chapter of the heath hen.

The widespread publicity that has been given to the last bird of its race is in itself evidence of the interest that the public has maintained for the vanishing heath hen on Martha's Vineyard Island. In the complicated and perplexing problems of conservation with which so many persons are concerned there is destined to be diverse and discordant opinions and the case of the heath hen has not been an exception. The Massachusetts Department of Conservation fully realizes that it has in the heath hen a responsibility and a trust that is not limited to the State but which is national in scope. In dealing with this problem the department has not followed its own inclinations, but at present as in the past, it has sought the advice of the leading sportsmen, ornithologists and conservationists

and has closely adhered to what appeared to be the best policy for the majority concerned."

Since the visit of Dr. Gross the heath hen was seen one morning between July 15 and 20, by Edward T. Vincent of Edgartown. He started the bird on the road between West Tisbury and Edgartown, about two miles east of James Green's farm where the bird is usually seen. It flew from the side of the road, not 25 feet from him, scaled into the scrub oak, and lighted. Though somewhat ragged looking, it flew strong.

The Division has maintained a keen interest in the welfare of the last heath hen, and unless there is definite and authentic evidence that the bird has died during the winter months, Dr. Gross will be engaged to make a further survey next spring.

*Penikese Island Sanctuary, Henry S. Turner, Caretaker*

This is the only reservation which has a permanent caretaker, and it is under the general oversight of the Supervisor of Fish and Game Permits and Claims.

The caretaker's bungalow received repairs and improvements to make living conditions comfortable. Likewise necessary repairs were made to the wharf, a new Palmer Ford engine was installed in the boat Cora, and a rowing dory has replaced the old skiff.

The tern colony arrived about ten days later than usual, and at once commenced egg-laying. The heavy rains at the end of June and on July 4 may have interfered with breeding, for in the middle of July it was found that the nests were abandoned and but few of the young could be located. As on other sections of the coast, eel grass, which is usually very plentiful, was entirely missing and the schools of sand eels and small fish (on which the gulls feed) were not abundant and did not appear much at the surface. Probably other factors could account in part for the poor breeding season. It is reported that much the same conditions prevailed on the other tern breeding areas. A large number of herring gulls bred at the east end of the peninsula. This colony is increasing, and apparently did well this season.

The rabbit colony has increased well, and 446 were released on the mainland. The clover planted last year, which was thought not to have germinated, came this spring in great abundance, making excellent food for the rabbits.

The effort over several years to establish bobwhite quail appears to be unsuccessful. Some of the first lots released that were not wing-clipped undoubtedly flew away from the island, while those that were clipped have gradually disappeared.

Following the usual custom, members of the Federation of the Bird Clubs of New England, Inc., assisted by Supervisor Bourne and Caretaker Turner, banded about 500 of the small terns, and a number of adults were trapped and banded. In the fall also some of the ducks which light on the island were banded for the U. S. Biological Survey. A few satisfactory returns of past bandings were received, the most distant being a duck banded December 21, 1929 and shot June 20 of this year some twenty-five miles north of Hopedale, Labrador.

A continual warfare is kept up against vermin of all kinds. Field mice, with which the island is overrun, appeared in large numbers this year. The same was true of garter snakes, of which about a thousand were killed in the early summer. These snakes were found to have eaten eggs and young terns.

The trees set to give bird food and shelter have not survived, except that a few shoots appeared from the roots this year.

The fresh water ponds were very low through the summer, and at times water had to be pumped from one of the nearby wells into the duck yard.

The wooden markers in the cemetery of the former leper colony hav-



ing decayed, they were replaced with small cast iron markers, numbered and initialed the same as the boards. A plan of the area has been made so that the markers could be properly replaced if disturbed, and a list of the names of the persons buried here, obtained from the town clerk of Gosnold, will be kept on file.

Constant police service is maintained to keep undesirable persons off the island.

### *Other Sanctuaries*

There is little to report concerning the various small areas which are sanctuaries for wild life, but on which no active work is carried on.

**THE ISAAC SPRAGUE BIRD SANCTUARY—CARR ISLAND.**—This sanctuary has been much improved by removal of the last of the buildings, i. e. the dwelling house and the boat house. The foundations and the well are the principal works of man to show what once was here.

The forty shrubs bearing small fruits, that were set last year have nearly all grown.

Rabbits have increased, and more small birds are seen nesting about the island than formerly. A general increase in wild life has been noted each year.

**BOXFORD SANCTUARY.**—The work of past year in poisoning gypsy moths has been followed up by further cruising for egg clusters. This will be necessary, for though the spraying was done thoroughly, moths from adjoining woodlots work in. A short path has been opened from the Clara Neil Brown tablet down the hill to the lower road, designated as the Fern Path as the hillside is covered with many varieties of ferns and brakes. Maiden hair ferns are in good numbers, and an abundance of the dagger ferns may be seen all the year round. One of the roads in the northerly section has been trimmed, and the Bald Hill Road has been filled and evened, so that both are now passable for forest fire apparatus.

**WATATIC MOUNTAIN WILD LIFE RESERVATION, ASHBY AND ASHBURNHAM; MINNS WILD LIFE SANCTUARY, PRINCETON; AND EDWARD HOWE FORBUSH WILD LIFE RESERVATION, HANCOCK.**—A small amount of trimming of brush at the boundaries has been the extent of the work at these reservations, making them easier of access in case of forest fires and for patrol of the boundaries by wardens during the hunting season.

**HUEBNER WILD LIFE SANCTUARY.**—The thirty-eight acre tract of land given the Commonwealth in 1930 by the New England Power Company near the Ayer State Game Farm, was not given detailed notice in last year's report. This fine area was fully posted this year, and a strand of telephone wire has been run completely around the boundaries. Considerable work is necessary to clear the land of tree tops and slash left on it by the private party who before it was given to the State held a right to cut out the white pines. This constitutes a serious fire menace, and also obstructs the new growth which is rapidly coming in.

### *Public Fishing and Hunting Grounds*

A permanent Field Agent was appointed upon the establishment of an eligible list,—Mr. Arnold E. Howard of Lowell, who established his headquarters at Russell. Mr. Howard continued the work of acquiring leases of land along the Westfield River for public fishing grounds, started last year. When the work had been completed there were fifty-four miles of land, covered by one hundred and ten leases, which run from April 1, 1932, to April 1, 1937.

The opening of the trout season on April 15 marked the opening of the first public fishing ground in the State when the sixty-four mile strip of public fishing ground on the three branches of the Westfield River was formally thrown open to the fishermen. Unsatisfactory weather conditions at the opening of the season limited the number of fishermen who



appeared on the river, but as the season progressed the number gradually increased.

Special warden patrol was maintained on this stream during practically the entire trout fishing season. The fishermen readily approved the plan and the way in which the stream was conspicuously posted for their convenience, and satisfaction was expressed by the owners of the leased lands with the manner in which the fishermen observed the regulations in regard to its use.

In the middle of July a second Field Agent, Mr. Edwin P. Simpson of Billerica, was appointed temporarily for the remainder of the year, in order that the work could be pushed in two parts of the State at one time. In order to locate possibilities for other public fishing grounds, the Division's biologists had been making a reconnaissance in the northeastern and southeastern parts of the State, covering thirty-nine streams (in addition to certain streams of which they were making an exhaustive survey and study as part of their biological work). Most of this large number of streams proved unsuitable, but the Squannacook River in Townsend, the Shingle Island River in Dartmouth, the Copicut River in Dartmouth and Fall River, and the Farmington River in Sandisfield, Otis and Tolland (together with its tributaries, the Buck and the Clam Rivers), were selected as meeting the requirements.

The Squannacook River, with several tributary brooks maintaining an all-year round flow, appeared to be the best stream, and the work of obtaining agreements to lease was commenced on August 1 by Field Agent Simpson. The plan received the approval of the Townsend National Bank and the Fessenden Companies, Inc. of Townsend, who own large distances along the stream. The owners have been willing to give parking places; and the rights of way to the river through the properties were acquired without difficulty where needed. Two owners who had previously posted their lands against hunting and fishing, adopted the Division's plan as a better method of control and leased their distances along the stream. To date in the distance between Townsend Harbor and Ash Swamp where the Squannacook River makes up, a distance of seventeen miles has been leased out of a possible twenty. The unleased parcels are mostly house lots, several owners being located too far away to contact personally. The leases run from April 1, 1933 to April 1, 1938. The leased grounds will be opened to the fishermen at the beginning of the trout season next spring, and they will be posted and controlled in a manner similar to that prevailing on the Westfield River system.

While the foregoing work was being done on the Squannacook River, Field Agent Howard had commenced, the first of August, securing agreements to lease lands upon the Konkapot River in Monterey and New Marlborough upon the recommendation of the Council of Sportsmen's Clubs of Massachusetts, and with assurance that the land owners were willing to open their lands to the public. Contrary to expectations, however, the land owners did not take kindly to the State's program, and after working six weeks in this territory it was decided to abandon this stream for the present. In contrast to the Westfield River System, which had but a very small percentage of posted territory, the Konkapot River was found to have nearly fifty percent of its length posted against hunting and fishing. The Southern Berkshire Land Owners' Association, which controls the entire upper end of this stream, went on record, at its annual meeting on October 3, not to lease to the State. Twenty agreements to lease, representing about three miles of the river, were acquired during the time spent there.

Following this Field Agent Howard spent considerable time in completing some of the detailed work on the Westfield River leases, after which he turned his attention to the Farmington River. Here much more friendly feeling was noted on the part of the land owners, as contrasted with that on the Konkapot River, and agreements covering over two miles of the river have already been signed up.

About November 1 Field Agent Simpson commenced getting agreements on the Copicut and Shingle Island Rivers in Dartmouth and Fall River. At the close of the year he was making satisfactory progress.

In order to place the public fishing grounds work on an efficient basis, the supervision of the leasing work, together with the maintenance of the leased property after the leases have been excuted, has been placed in the hands of the Supervisor of Permits and Claims, who is responsible for the erection and maintenance of suitable posters for the mutual benefit of the land owners and the sportsmen.

While considerable study has been given to the question of establishing public hunting grounds, no definite policy has yet been established and no work done along those lines.

## INLAND FISHERIES

### PONDS

No rights of way to any of the great ponds were established this year. Although a petition was filed (under chapter 453, Acts of 1923) for laying out such a right of way to Lake Marguerite or Simon's Pond in Sandisfield, and reported on in House 1220 by the Department of Public Works, it did not receive favorable action.

#### *Great Ponds Stocked and Closed*

Within the period of this report (Dec. 1, 1931 to Nov. 30, 1932) the following-named ponds were stocked under S. 40, C. 131, G.L. and regulations applied by the Director closing the ponds to fishing for the periods listed below, with a penalty of twenty dollars for each violation of the regulations.

This list does not include ponds on which similar regulations have been applied in past years, and which are still in effect.

Body of Water	Town	Regulations are effective for the following periods, both dates inclusive.
Watson's Pond . . . . .	Taunton	Jan. 6, 1932 to May 29, 1932 Nov. 1, 1932 to May 29, 1933 Nov. 1, 1933 to May 29, 1934
Sabbatia Lake (also called Scaddings or Scuddings Pond)	Taunton	Jan. 7, 1932 to May 29, 1932 Nov. 1, 1932 to May 29, 1933 Nov. 1, 1933 to May 29, 1934
Mirimichi Lake (also called Shepards Pond)	Foxboro and Plainville	Nov. 1, 1932 to May 29, 1933 Nov. 1, 1933 to May 29, 1934 Nov. 1, 1934 to May 29, 1935
Mary's Pond (also called Cary's Pond) . . . . .	Rochester and Marion	Nov. 1, 1932 to May 29, 1933 Nov. 1, 1933 to May 29, 1934 Nov. 1, 1934 to May 29, 1935
Snow's Pond . . . . .	Rochester	Nov. 1, 1932 to May 29, 1933 Nov. 1, 1933 to May 29, 1934 Nov. 1, 1934 to May 29, 1935
Snippatuit Pond . . . . .	Rochester	Nov. 1, 1932 to May 29, 1933 Nov. 1, 1933 to May 29, 1934 Nov. 1, 1934 to May 29, 1935
Monponsett Lakes, East and West . . . . .	Halifax and Hanson	Nov. 1, 1932 to May 29, 1933 Nov. 1, 1933 to May 29, 1934 Nov. 1, 1934 to May 29, 1935



*Breeding Areas in Ponds and Streams*

No breeding areas in great ponds were closed during the year. Such regulations are still in effect on Lake George in Wales (until Dec. 1, 1932) and on Bare Hill Pond, Harvard (until Dec. 1, 1932) and on Bare Hill Pond, Harvard (until Dec. 1, 1933).

Under the provisions of Chapter 78, Acts of 1932, the Director was given authority to close feeder or tributary streams to all fishing wherever, in his opinion, such action would improve the fishing conditions, provided the consent of the riparian land owners could be obtained. The pressure of other work made it necessary for the Director to refer this matter to the County Leagues, with a suggestion that an effort be made to secure the necessary consents from the riparian land owners along the tributary streams to the principal trout brooks in each county. Apparently no action was taken by the county leagues in connection with this important conservation measure. But as soon as time will permit, the Division will proceed under the terms of this statute as such a program has potential means of greatly improving the trout fishing conditions. It is selfevident that trout streams of the State cannot indefinitely maintain trout fishing if the entire area is open to the fishermen, and the judicious use of the authority granted by this statute should show a marked improvement in trout fishing as its provisions are brought into operation on various trout streams.

**PROPAGATION OF FISH AND GAME****FISH HATCHERIES AND GAME FARMS—GENERAL**

At the beginning of the year several parcels of land were held under lease at the various fish hatcheries, and as a part of the general development program it was decided that all of the land necessary at this time should be purchased in order that a definite program could be laid out.

The following purchases were made: for the Sutton Ponds, at the Sutton State Fish Hatchery, 12 acres from Grace E. Sullivan, 8 acres from George T. Young, 25.97 acres from David Welch et als, 34.4 acres from George H. Thompson, and 5.86 acres from Fred L. Batcheller; for the Sunderland State Fish Hatchery, 2.34 acres from Louis Horst, Fish Culturist in charge. The foregoing represents all the land necessary for the propagation work.

An effort was made to purchase a parcel of land from the town of Sutton in connection with the development of the Sutton Ponds but as satisfactory arrangements could not be made with the town officials and the land was not absolutely necessary for the fish cultural work of the station, the option was relinquished and the use of the land discontinued at the end of the fiscal year. Options on three parcels of land at the Montague State Fish Hatchery, which were held by Mr. Ralph Bitzer, the Fish Culturist in charge, were also given up because they are not necessary for the final development of the station.

To prevent confusion in the minds of the public an official designation was adopted for each fish hatchery and game farm, and an ornamental sign bearing the name of the station has been placed at the entrance to each plant. In the future these fish hatcheries and game farms will be designated as follows:

Ayer State Game Farm	Montague State Fish Hatchery
Marshfield State Game Farm	Palmer State Fish Hatchery
Sandwich State Game Farm	Sandwich State Fish Hatchery
Wilbraham State Game Farm	Sunderland State Fish Hatchery
East Sandwich State Fish Hatchery	Sutton State Fish Hatchery

The station formerly known as the Amherst Fish Hatchery is now known as the Sunderland State Fish Hatchery, for the reason that the land at the station is located entirely within the town of Sunderland.



From the foregoing it will be observed that many of the stations heretofore designated as fish rearing stations have become full-fledged hatcheries. It is the purpose of this Division to establish each fish hatchery as an independent producing unit, similar to the game farms, which is contrasted with the previous policy of hatching the fish at three of the stations and then transferring the fry to the fish rearing stations. This plan will place each fish hatchery on an independent basis, and eventually make it possible to definitely and accurately determine the cost of producing fish at each station. This was not entirely possible under the past system of interchanging stock from one station to the other. The hatchery buildings at the Sutton State Fish Hatchery and the East Sandwich State Fish Hatchery were put in condition again, and will operate in the future in the hatching of the fish necessary for the maintenance of the plant.

In addition to the new construction work enumerated under the various stations, the usual amount of repair and replacement work was carried on to maintain the plants on an efficient operating basis. Although this work was extensive and represented the expenditure of a considerable amount of money for all of the stations, yet it consisted entirely of small projects, the enumeration of which is eliminated in keeping with the necessity of the condensation of this report.

The areas at the hatcheries which required reforestation and on which such work has been carried on for some years, have practically all been taken care of, and it is expected that the reforestation program at all of the stations will be completed in another year.

A definite daily wage scale and uniform working hours were established for the labor service at the game farms and fish hatcheries as contrasted with the past policy of hourly, weekly and monthly rates at the various stations. The rent allowances formerly given to fish culturists and game culturists who do not live in State-owned houses was discontinued and the salaries of the culturists affected were adjusted to place them on an equal basis with culturists living on State-owned property. This readjustment not only placed all of the culturists on an equal basis but effected a considerable saving of money to the Division. All of the employees who are not entitled to living quarters as a part of their wages, but who live in State-owned houses, are required to pay a monthly rental commensurate with the type of building occupied, and this rule has added somewhat to the revenue of the Division.

All of the fish culturists and game culturists were appointed as fish and game wardens, thus giving them full authority to enforce the fish and game laws not only on the areas under their immediate charge, but anywhere throughout the State where they may witness violations of the law, particularly while they are engaged in planting fish or game.

The vacation allowances of the culturists were adjusted to place them on the same basis as the warden force, and under the new ruling the culturists are granted two weeks vacation during the summer months, and two weeks during the winter months. This eliminates the handicap previously placed upon the work when some of the culturists took four weeks vacation during the summer months.

To effect further economies a survey of the telephone service was made at all of the hatcheries and unnecessary extension sets or special equipment were eliminated. A similar survey is being made of the electric light and power service, and while this is not completed the possibilities of savings along this line have become apparent.

*East Sandwich State Fish Hatchery—Alfred C. Fish,  
Assistant Fish Culturist in Charge*

**NEW CONSTRUCTION.**—The hatchery building was reconstructed and put into use, as this station is being transformed from a rearing station to an independent unit.

**BROOK TROUT.**—The year opened with 47,508 fingerling brook trout on

hand, 2,508 of which were lost and 45,000 reclassified as yearlings. Of these 10,710 were lost or unaccounted for, 33,580 distributed to public waters, and 710 distributed for display purposes.

There was evidence of furunculosis in some of the pools, and after the fish were distributed the pools were carefully sterilized with chlorine. No trace of the disease has appeared among this year's hatch.

For the work of the year, 70,272 brook trout fry were received from the Sandwich State Fish Hatchery, 1,125 of which were lost and 69,147 reclassified as fingerlings. Of these 19,060 were lost or unaccounted for, 22,612 (4,062 2-4 inch and 18,550 5-6 inch) distributed to open waters, and 27,475 are on hand November 30.

CHINOOK SALMON.—For the work of the season, 50,000 Chinook salmon eggs were received in exchange for brook trout eggs purchased and sent to the California Fish and Game Commission. 3,220 were lost and 46,780 fry hatched, of which 3,305 were lost and 43,475 fingerlings were distributed to open waters.

*Montague State Fish Hatchery, Alph Bitzer,  
Fish Culturist in Charge*

NEW CONSTRUCTION.—In addition to the general repair and replacement work on the dams and pools, a large pond was constructed at the lower end of the hatchery property. This will be used for holding the brook trout maintained as brood stock. This completes the development work at this station, as all of the land now owned by the Commonwealth has been fully developed, and future operations will be the maintenance and operation of the plant as now constructed.

NEW EQUIPMENT.—The oxygen tank which had been used by Salvage Unit No. 1 was transferred to this station when new salvage equipment replaced it.

BROOK TROUT.—Of the 317 adult brook trout on hand at the beginning of the year, 55 were lost, 112 distributed for display, and 150 remain on hand November 30.

The year opened with 121,440 fingerlings on hand (a recount added 20,840 to the previous inventory of 106,600). All were reclassified as yearlings, and of these 21,300 were distributed to club rearing pools, 95,140 to open waters, 800 were lost and 4,200 retained as the nucleus of a brood stock and from which eggs were stripped in the fall of 1932.

Late in December of 1931, 440,000 eggs from three-year-old fish were purchased, and to these were added in February 25,000 eggs from two-year-old fish, also purchased. Of the 465,000 eggs handled, 19,117 were lost and 445,883 hatched, of which 90,076 were lost, 140,545 transferred to the Sunderland State Fish Hatchery, and 215, 262 reclassified as fingerlings. Of these 6,012 were lost, 164,250 (63,300 2-4 inch and 100,950 4-6 inch) distributed to open waters, and 45,000 remain on hand November 30.

RAINBOW TROUT.—A brood stock of rainbow trout is maintained at this station. The year opened with 944 adults on hand, to which were added 1,600 yearlings reclassified as adults. Of these 2,544 adult fish, 6 were distributed for display, 128 lost, and 2,410 are on hand November 30.

Of the 5,100 yearlings on hand December 1, 1,600 (reared from eggs collected at this station) were added to the adults, 2,795 distributed to open waters, and 705 lost.

The year opened with 50,650 fingerlings on hand (a recount added 2,650 to the previous inventory) of which 13,500 were distributed to open waters, and 37,150 reclassified as yearlings. Of these 800 were transferred in June to the Sutton State Fish Hatchery and 36,350 distributed to open waters.

For the work of the season 50,000 eggs were received on December 3, 1931 from the U. S. Bureau of Fisheries station at White Sulphur Springs, West Va. in exchange for which we purchased and shipped to their Nashua, N. H. station 50,000 brook trout eggs. From the middle of January to the middle of February, 65,000 eggs were collected from the



brood stocks at this station and about the middle of April, 5,000 more were taken from the station stock making a total of 120,000 rainbow trout eggs handled. Of the eggs received and collected, 29,500 were lost and 90,500 hatched, of which 10,000 were lost and 80,500 reclassified as fingerlings. Of these 3,500 were lost, 10,000 transferred to the Sutton State Fish Hatchery in November, 75 distributed for display, 16,200 distributed to open waters, and 50,725 are on hand November 30.

*Palmer State Fish Hatchery—William F. Monroe,  
Fish Culturist in Charge*

**BROOK TROUT.**—The year opened with 71,998 fingerling brook trout on hand, all of which were reclassified as yearlings. 32,773 were lost, 500 transferred to the Sandwich State Fish Hatchery as control fish in the sterilization work at that station, 33,425 were distributed to public waters, and 5,300 distributed to club rearing pools.

From the supply pond 16 adult brook trout were collected and distributed to open waters.

For the work of the season 215,000 eggs from three-year-old fish were purchased, of which 9,158 were lost and 205,842 hatched. Of the fry hatched, 20,644 were lost, 82,000 transferred to the Sutton State Fish Hatchery, and 103,198 reared and reclassified as fingerlings. Of these 32,098 were lost or unaccounted for, 65,900 (15,500 1-inch and 50,400 4-6 inches) distributed to public waters, and 5,200 are on hand November 30.

**SMALL-MOUTH BLACK BASS.**—The season started with 251 adult brood fish on hand, to which were added early in May, 181 brood stock fish taken in a salvage job. Of these 6 were distributed for display purposes, 126 were lost, and 300 are on hand November 30.

From the bass ponds there were collected and distributed to open waters 175,000 fry and 35,900 fingerlings. In addition, 75 fingerlings were distributed for display. The fingerling production fell somewhat short of other years. This was partly due to the fact that seven adult large mouth black bass which had been held in the stock ponds for exhibition purposes, spawned, and the resulting fry passed through the screens into two of the rearing ponds used for small mouth bass. The large mouth black bass so outgrew the small mouth bass, that when the pond was drawn off it was found they had eaten a great number of the small mouth bass fingerlings. The large mouth bass fingerlings were distributed in October. Many of these fish, hatched in May, had reached six inches in length. All large mouth black bass have been removed from the ponds to avoid a repetition of this experience.

The natural food supply in the bass ponds was increased by planting aquatic plants in those ponds which were barren, and every effort is being bent to further increase the natural food supply by fertilizing the ponds. From a pond in the eastern part of the State 15,000 mummychugs were collected and used for bass food.

**PICKEREL, BLUE GILLS, HORNED POUT, LARGE MOUTH BASS.**—To the horned pout on hand at the beginning of the year were added 30 adults from a salvage job.

From the supply ponds were collected and distributed the following: 355 pickerel, 223 blue gills, and 1,822 horned pout. From the bass ponds there were also collected and distributed 1,660 large mouth black bass.

*Sandwich State Fish Hatchery—Irving E. Lewis,  
Fish Culturist in Charge*

**BROOK TROUT.**—The year opened with 90,868 fingerlings on hand, all of which were reclassified as yearlings. Of these 13,638 were lost, and 77,230 distributed to open waters.

From the Palmer State Fish Hatchery 500 yearlings were received to be used as control fish in the sterilization work at this hatchery. Of these



54 were lost and 446 are on hand November 30 as the nucleus of a brood stock, from which eggs were stripped this fall.

About the middle of December, 1931, there were purchased 445,000 brook trout eggs from three-year old fish, and to these were added on February first, 75,000 brook trout eggs from two-year-old fish, also purchased, making a total of 520,000 eggs handled at this station. Of these 14,760 were lost and 505,240 hatched. 70,272 were transferred to the East Sandwich State Fish Hatchery, 73,500 were lost, and 361,468 were reclassified as fingerlings. There were 198,268 fingerlings lost, 31,400 (4-6 in.) distributed to public waters, and 131,800 are on hand November 30.

*Sunderland State Fish Hatchery,—Louis Horst,  
Fish Culturist in Charge*

**NEW CONSTRUCTION.**—Further development was carried on in the so-called Graves tract, and as a result a large pond and five pools were constructed for the propagation of brown trout. While considerable development work still remains to be done at this station, the additions of this year will increase the output of brown trout by several thousand.

The combined garage and storage building constructed last year was completed and a modern meat room installed, with a new motor and large meat grinder capable of handling the feed for the increased production. A new shipping stand was built in the rear of the new building. The combination of this work made it possible to remove the old garage, meat house and shipping stand, all of which had become obsolete and marred the appearance of the hatchery grounds.

**NEW EQUIPMENT.**—A new oxygen tank for distribution work was purchased and put into service at the beginning of the fall distribution work.

**BROOK TROUT.**—No brood stock of brook trout had been held over at this station.

Of the 82,000 fingerling brook trout on hand at the beginning of the year, 2,000 were lost as fingerlings and 8,000 reclassified as yearlings. Of these 3,930 were lost, 65,970 distributed to open waters, and 10,100 distributed to club rearing pools.

During March and April 140,545 brook trout fry were received from the Montague State Fish Hatchery. They were a vigorous lot and after a loss of 2,545 as fry made splendid growth during the summer. 138,000 were reared and reclassified as fingerlings.

Of the fingerlings, 75 were distributed for display purposes, 100,850 (4-6 inch) to open waters, 11,925 were lost and 25,150 are on hand November 30.

**BROWN TROUT.**—A brood stock of brown trout is maintained at this station, and all eggs collected, as well as the eggs received from other sources, are hatched here.

The year opened with 529 adult brown trout on hand, 30 of which have been distributed for display purposes, and 499 are on hand November 30.

The year opened with 62,495 fingerlings on hand (a recount added 7,495 to the previous inventory), 30 classified as fingerlings were distributed for display purposes early in the year, and the balance of 62,465 reclassified as yearlings. Of these 8,000 were turned over to the Sutton State Fish Hatchery for brood stock, 15 distributed for display, 52,650 to open waters, 1,500 to club rearing pools; and 300 are on hand November 30.

During November, 1931 there had been 352,000 eggs stripped from the station's brood stock. These eggs developed white spot disease and 50% of losses in eggs and fry can be attributed to this cause. The remaining fry made a surprisingly good growth, attributed mostly to feeding with dried salmon eggs, used for the first time in brown trout feeding at this station. In addition 100,000 brown trout eggs were received from the U. S. Bureau of Fisheries station at Bozeman, Mont. in exchange for brook trout eggs purchased and sent to their Nashua, N. H. station,

making 452,000 eggs handled of which 324,000 hatched. The new ponds built in the Hubbard tract for rearing brown trout proved to be very satisfactory, the fish making an exceptionally good growth.

Of the fry hatched, 800 were distributed for study purposes, 160,300 lost and 162,900 reclassified as fingerlings. Of these 75 were distributed for display purposes, 57,825 lost and 105,000 are on hand November 30.

*Sutton State Fish Hatchery,—Arthur Merrill,  
Fish Culturist in Charge*

**NEW CONSTRUCTION.**—At the fish hatchery the series of pools below the road were reconstructed and repaired and brought back into use after a lapse of several years. These were used for rearing brown and rainbow trout. The hatchery building was reconstructed and put into use as part of the plan to make the plant an independent unit.

**BROOK TROUT.**—No brood stock of brook trout had been retained at this station.

The year opened with 36,000 fingerling brook trout on hand, all of which were reclassified as yearlings. Of these, 2,191 were lost, 52 distributed for study, and 33,757 to open waters.

For the work of the year 82,000 brook trout fry were received from the Palmer State Fish Hatchery, of which 22,000 were lost and 60,000 reared and reclassified as fingerlings. Of these 8,000 were lost, and 52,000 are on hand November 30. The growth of the fingerling stock was not as good as in previous years when the pools were stocked with fry that began feeding three months earlier. Growth appeared to be checked during the latter part of the summer when there was an abnormally low flow of water, but was accelerated when the heavy rains increased the flow. The shrinkage of fish in numbers due to predatory vermin was as usual, but less than might be expected as the measures taken against this vermin were more than usually effective.

In selecting the brown and rainbow trout for distribution 300 adult brook trout were sorted out and from which eggs were stripped in the fall. They are on hand November 30.

**BROWN TROUT.**—The year opened with 10,000 brown trout fingerlings on hand, and these were later all reclassified as yearlings. They were carried through the summer on an exceptionally small flow of water and made satisfactory growth, with normal losses and no trace of disease. An additional lot of 8,000 yearlings was received in June from the Sunderland State Fish Hatchery. Of these 18,000 fish, 3,690 were lost, 10 distributed for study, and 14,300 to open waters.

**RAINBOW TROUT.**—As an experiment, 800 rainbow trout yearlings were transferred to this station from the Montague State Fish Hatchery in June. 280 were lost, 10 distributed for study, and 510 held until October when they were distributed. This lot of fish was carried through the summer in the same section of the hatchery as the brown trout on an exceptionally small flow of water, and made very satisfactory growth. A lot of 10,000 rainbow trout fingerlings was transferred from the Montague State Fish Hatchery in November, 1,100 of which were lost and 8,900 are on hand November 30.

**SUTTON PONDS.**—These ponds are considered a part of the Sutton State Fish Hatchery. Hereafter what have been known as the Stockwell Pond Unit, the Welsh-Sullivan Unit and the Sutton-Thompson Unit will be treated under the head of Sutton Ponds. The outstanding development upon this area was the construction of a large fish trap and holding pockets for use in the distribution of the pond fish propagated on this area. It had been the past policy to carry on at the Sutton Fish Hatchery the sorting and distribution of the product of the pond system, but an independent shipping stand was built at the pond system and all fish are now shipped directly from the ponds, eliminating the re-handling of the fish and the time and expense of trucking them to the hatchery. With



the relinquishment of the options on land not necessary for the development of the pond system, this area has been brought to a point of completion for all practical purposes, and while a small amount of additional work must be done next year it will be in the nature of minor changes in the present system, rather than extension or development.

When the ponds were drawn down to make distribution of the crop of fish produced in 1931, they were restocked with a view to securing, in 1932, as large a proportion of yearlings as possible. To this end large numbers of fingerling horned pout and perch, and as many crappie as it was possible to sort out, were returned to the ponds. No restocking was made with blue gills as it is the plan to abandon the distribution of blue gills as rapidly as the brood stock can be eliminated from the pond system. As usual the channels were cleaned down as thoroughly as could be done to eliminate the common sunfish, and shiners except where the latter were needed for fish food.

During 1932 the production of yearling fish was large in all ponds, reaching, for the system as a whole, the highest number for any year.

Horned pout fingerling production was normal in all ponds, and exceptionally high in the Sutton-Thompson Ponds, which had been stocked mainly with that species.

Perch bred heavily in all ponds where the old stock had been returned, and the 1932 production was a record one.

Crappie in 1932, as was the case the year before, had a non-breeding year, and the number produced was very small.

Pickereel production was fair in all ponds, but much better, in proportion to the breeding stock, in other ponds than the Welsh pond. The latter had been stocked largely with pickereel, but with only as many fingerlings of other species as it was estimated were necessary for pickereel food. When the Welsh Pond was drawn down the stock of mixed fish found in it was excessively large in proportion to the number which had been put back, showing that there had been a large drift from the other ponds. On this account the Arnold Pond has been selected to carry the heaviest stock of pickereel for the 1933 crop, as this pond can receive no drift from other ponds.

No blue gills had been returned to the ponds in 1931, as previously stated, and the stock taken out in 1932 was the product of stock that had remained in the channels of the various ponds.

Breeding and restocking could be done to much better advantage if all undesirable fish could be exterminated. Then production could be limited to the species intended for cultivation. This would obviate the necessity of the most troublesome job in drawing the ponds, that is, driving the channels to remove the undesirables. The three species that should be eliminated, shiners, common sunfish, and blue gills, do not serve any useful purpose in the production of any other fish, as is shown by the production of pickereel in the Sutton Pond, where none of these fish existed.

The Sutton Pond had been used for horned pout breeding only, all other fish having been eliminated by treatment. When it was drawn, pickereel were found in considerable numbers, which may be explained as a probable overflow from an adjacent pond, probably during the high water of spring, as the larger number were fingerlings. Not more than 15 to 20 were of breeding size. The production from these breeders was near two thousand, possibly an increase of 100%. This output is of great interest as indicating the conditions favorable for pickereel breeding. The pond contained horned pout in great numbers, but no other fish that pickereel ordinarily feed on, and the fingerlings must of necessity have fed wholly on insect food. When the pond was drawn into the lower Sutton Pond, the water was clouded with swimming insects, showing a food supply for a great number of fish, and this food the horned pout evidently did not eat. It appears from this output, and the average large size of the fingerlings (well above 7 inches), that fish food is not necessary for pickereel,



and since in all other ponds the pickerel production was so much smaller in proportion to the breeding stock, it is very evident that the food fish put in for pickerel do more harm in destroying young pickerel, than good as a pickerel food supply.

As a further test 75 breeding pickerel were put in the Thompson pond where the only other stock is horned pout, the results of which remains to be seen.

The following stock from outside sources was planted in the ponds: from Little and Salt Ponds, Falmouth, 52 yellow perch (10 to 12 inch); from Lynde Brook Reservoir, Leicester, 71 yellow perch (10 to 13 in.).

Distributions from the ponds to open waters, club rearing pools and for display and study for the period of this report totalled 741,888 pond fish, divided as follows: 118,376 blue gills; 309,462 horned pout; 11,497 pickerel; 279,014 yellow perch; 23,539 crappie. In addition, 83,499 food forms were distributed to open waters, for exhibit and study, and to the Palmer State Fish Hatchery.

### *Work of the Salvage Units*

Two new two-ton Dodge trucks were purchased for the salvage units, replacing the White and Reo trucks which had become worn out in the service. Both units were equipped with oxygen tanks for the distribution of fish, and the tank formerly used by Unit No. 1 was transferred to the Montague State Fish Hatchery for use in the distribution of fish from that station.

No new methods were tried in catching the fish, the portable fyke traps with D-shaped hoops and long leaders being wholly used. Much scouting was done in search of a supply of white perch, but this species has become rather scarce in the coastal ponds during the past few years. Mill Pond, Yarmouth, Kelly's Pond, Dennis, and Follins Pond, Dennis and Yarmouth, were prospected in search of white perch in quantities, but without success. Salvage operations were started early in April at Oyster Pond, Falmouth, to secure the spring supply of white perch to be used in stocking inland ponds. The weather conditions in April were adverse to successful operations, being unseasonably cold with heavy wind about all that month on the coast. Oyster Pond did not produce the white perch in the desired numbers, and after nine days the operations were transferred to Little Pond, Falmouth. This pond also did not produce the white perch, and again the work was transferred, this time to Salt Pond, Falmouth, where better success was met.

The complete schedule of salvage jobs by both units for securing both white perch and pond fish, follows:

#### *Salvage Unit No. 1—William H. Seaman, Fish Culturist in Charge*

Oyster Pond, Falmouth, April 12 to 18. 40,840 yellow perch, 4,760 white perch, planted in open waters. Total—45,600.

Little and Salt Ponds, Falmouth, April 19 to 30. 195 horned pout, 10,725 yellow perch, 14,200 white perch, planted in open waters. In addition 340 white perch were sent to the U. S. Bureau of Fisheries Station at Woods Hole for experimental purposes, and 52 yellow perch were sent to the Sutton Ponds for breeding purposes. Total—25,512.

Great Pond, Weymouth, May 6 to 14. 1,375 horned pout, 50 pickerel, 3,650 yellow perch, 8,700 white perch, 410 small mouth black bass, planted in open waters. In addition 24 horned pout were sent to Harvard University for research and 35 horned pout, 1 pickerel, 50 yellow perch, 50 white perch, 6 small mouth black bass to the South Boston Aquarium for exhibition purposes. Total—14,351.

Johnson's Pond, Boxford and Groveland, May 17 to 21. 680 horned pout, 152 pickerel, 3,050 yellow perch, 2,850 white perch, 29 large mouth black bass, planted in open waters. Total—6,761.

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Wenham Pond, Wenham and Beverly, May 23 to 31. 285 horned pout, 170 pickerel, 190 yellow perch, 5,730 white perch, 115 small mouth black bass, planted in open waters. Total—6,490.

Butler Ames Pond, Tewksbury and Andover, June 6 to 14. 8,900 blue gills, 17,650 crappie, 350 horned pout, planted in open waters. Total—26,900.

Hales Brook, Chelmsford, June 9. 600 crappie, 1,800 horned pout, 1,200 yellow perch, planted in open waters. Total—3,600.

Suntaug Lake, Lynnfield and Peabody, June 15 to 21. 600 crappie, 15 horned pout, 40 pickerel, 200 yellow perch, 300 small mouth black bass, planted in open waters. In addition 25 crappie, 6 pickerel, 4 small mouth black bass, 3 crap and 15 sunfish were sent to the South Boston Aquarium for exhibition purposes. Total—1,208.

Long Pond, Falmouth, June 24 to July 2. 420 yellow perch, 2,230 small mouth black bass, planted in open waters. Total—2,650.

Buckmaster Pond, Westwood, July 6 to 11. 4 pickerel, 200 yellow perch, 50 small mouth black bass, planted in open waters. In addition 551 horned pout were planted in Hersey Pond, Foxborough, and 16 small mouth black bass in Hemingway Pond, Milton for breeding purposes. Total—821.

Silver Lake, Halifax, July 14 to 16. No results.

*Salvage Unit No. 2—Elmer A. Macker, Fish Culturist in Charge*

Birch Pond, Lynn and Saugus, April 11 to 21. 58 pickerel, 386 yellow perch, 56 small mouth black bass, planted in open waters. Total—500.

Walden Pond, Lynn and Saugus, April 22 to 26. No results.

Lynde Reservoir, Leicester, April 29 to May 11. 910 horned pout, 154 pickerel, 1,230 yellow perch, 160 small mouth black bass, planted in open waters. In addition 71 yellow perch were sent to the Sutton Ponds and 181 small mouth black bass and 30 horned pout were sent to the Palmer State Fish Hatchery for breeding purposes. Total—2,736.

Cedar Meadow Pond, Leicester, May 13 to 24. 6,175 horned pout, 75 pickerel, 15,165 yellow perch, 18,275 white perch, planted in open waters. Total—39,690.

No Town Reservoir, Fitchburg and Leominster, and Simond's Pond, Fitchburg, May 27 to June 10. 6,495 horned pout, 20 pickerel, 9,100 yellow perch, planted in open waters. Total—15,615.

Phillipston Reservoir, Phillipston, June 13 to 20. 200 horned pout, planted in open waters. Total—200.

Basin No. 2, Deerfield River, Conway, June 22 to 25. No results.

Beaman Reservoir, North Adams, June 23. No results.

Echo Lake, Hopkinton, July 1 to 11. 1,008 yellow perch, planted in open waters. Total—1,008.

Ashby Reservoir, Ashby and Ashburnham, July 16 to 23. 40 horned pout, 29 pickerel, 1,125 yellow perch, planted in open waters. Total—1,194.

*Miscellaneous Salvage*

Several smaller lots of miscellaneous fish were salvaged by the wardens and the fish planted in local ponds:—

From a pond in the eastern part of the State 15,000 mummychugs were collected and taken to Palmer State Fish Hatchery for bass food.

From Millvale Reservoir, Haverhill—2 pickerel; 23,300 yellow perch. Total—23,302.

From Hersey Pond, Foxboro—76 pickerel, 600 suckers, 750 sunfish. Total—1,426.

From Henry's Pond, Taunton—520 horned pout, 45 sunfish. Total—565.

The salvage operations resulted in the collection of 218,716 fish (194,818 by the salvage units and 23,898 from the miscellaneous jobs by wardens) as well as 16,413 food forms collected by the salvage units and wardens.



Of the 218,716 fish salvaged, 217,274 were distributed to open waters, 123 to the Sutton Ponds for breeders, 211 to the Palmer State Fish Hatchery for breeders, 201 for exhibition and study, 340 to the U. S. Bureau of Fisheries, and 567 to ponds for breeding purposes.

There are benefits arising from this branch of the work other than the restocking of depleted ponds, in that the removal of a portion of the fish of an over-stocked pond leaves more feed for the remaining fish, thus promoting growth. This is borne out by the fact that in 1931 there were 46,000 very small fish taken from a certain pond. The following year only 40,000 were taken from the same pond, but these fish averaged at least two inches longer, and it took nine more truckloads to dispose of the 40,000 larger fish than for the 46,000 smaller.

Likewise  $5\frac{1}{2}$  to 6 inch white perch, undersized on account of insufficient feed, transplanted in 1931 to a pond where feed was plentiful, measured from 11 to 13 inches when taken this fall.

*Ayer State Game Farm—Edward E. Backus, Game Bird  
Culturist in Charge*

**NEW EQUIPMENT.**—The Buffalo electric incubator was exchanged for an up-to-date model of the same make, and an additional new No. 7 Buffalo was purchased; a Centaur tractor was added to the equipment; and an electric pumping system with a 550 gallon storage tank was installed.

**PHEASANT BREEDING.**—The year opened with 778 pheasants on hand (204 of the old brood stock and 574 of the 1931-hatched birds) to which were added late in December four hen pheasants seized by a warden when found in illegal possession.

Losses of 32 birds reduced this number to 750 at the beginning of the laying season, and in March 81 cocks and 648 hens were mated in the proportion of eight hens to each cock. The birds had been carried wing-clipped in the open pens during the winter. At this time the stubs of the clipped feathers were removed and when the surplus birds reached a full-winged condition they were distributed for liberation.

The first eggs were collected on April first, and production rapidly increased until by the end of the month the daily collections exceeded 400. The first eggs were set in incubators on April 17, and the first distribution to applicants was made on April 27.

A total of 25,313 eggs were collected, of which 1,270 were sent to the Marshfield State Game Farm, 10,175 distributed to applicants, 6,194 discarded (many of which were sent to a state institution for food purposes) and 7,674 set in incubators.

Of the eggs set, 3,725 proved to be infertile, contained dead embryos or otherwise failed to hatch, and 3,949 hatched. Of these 1,722 were lost and 2,227 were reared. 1,551 were liberated in covers, 570 turned over to sportsmen's club for wintering, and 106 are on hand November 30.

The only change in feeding methods worthy of note was the substitution of Larro Turkey and Game Bird Starter for the Chapin Start-all Kernels for the first ten days after hatching, after which the Chapin Kernels became, as formerly, the entire ration.

Increasing the ventilation facilities in several of the incubators resulted in greatly improved hatches and a notable decrease in the number of crippled chicks produced, such cripples being less than  $1\frac{1}{2}\%$  of the chicks hatched.

No disease of a contagious or infectious nature was experienced during the year, but gape worms appeared for the first time in the history of the farm and occasioned heavy losses before the trouble could be controlled.

In past year a stock of several hundred pheasants has been carried at this station for the production of eggs to be distributed to sportsmen's clubs and interested individuals, but a change in policy was effected



this year whereby this work will be discontinued. Therefore, the brood stock heretofore maintained for this purpose was distributed at the end of the laying season, and in future this station will be maintained solely for producing birds.

Of the 750 adults on hand at the beginning of the laying season, 513 were distributed to open covers, 21 were lost, and 216 remain on hand November 30.

QUAIL BREEDING.—The year opened with 308 adult quail on hand (60 of the old brook stock and 248 1931-hatched birds).

During the winter and early spring 43 were lost, the majority through injuries received in fighting as the breeding season approached, 165 were distributed for liberation in covers, 20 were distributed for breeding purposes and 80 (40 pairs) retained for brood stock. Early in the season, one cock was accidentally killed and was replaced by a cock from the Sandwich State Game Farm.

The breeders were transferred to the laying pens early in April and the first eggs were observed in the nests on April 23, were collected on April 25, and the last on September 19. A total of 1,988 eggs were collected, 47 of which were discarded, and 1,941 set in incubators. 611 proved infertile, contained dead embryos, or otherwise failed to hatch, and 1,330 hatched. To these have been added 60 1932-hatched birds from the Wilbraham State Game Farm. Of these 1,390 birds, 352 were lost and 1,038 reared, of which 550 have been released in covers, and 488 are on hand November 30.

Of the 81 broodstock birds on hand at the beginning of the laying season, 24 (including the cock mentioned above) were lost, 34 distributed, and 23 remain on hand November 30.

*Marshfield State Game Farm—L. B. Sherman, Game Bird  
Culturist in Charge*

NEW CONSTRUCTION.—A combination workshop, storage building and incubator cellar was constructed at this station. The old barn was demolished. The construction of this building established this plant as an independent unit, as heretofore the incubator cellar was rented from Mr. L. B. Sherman, the Game Culturist in charge. All of the work will in future be conducted on the property of the Commonwealth.

The quail equipment at this station was increased by the construction of 52 single or 26 double intermediate brooders, built by Game Bird Culturist Sherman. These are used for holding the birds after they are taken from the Coleman brooders, and before they are placed in the ground pens preparatory to shipping.

NEW EQUIPMENT.—A new No. 7 Buffalo electric incubator was bought.

PHEASANT BREEDING.—The year opened with 400 pheasants on hand (241 of the old brood stock plus 159 1931-hatched birds), which wintered well after being transferred to covered yards from open yards where they had been disturbed by vermin. To these were added 25 hen pheasants purchased in February.

Prior to the beginning of the laying season, 29 birds were lost, leaving 396 on hand.

The first egg was picked up on March 30, and the last on July 21. A total of 12,044 eggs was collected. 2,950 eggs were transferred to this station from Ayer and Wilbraham, making a total of 14,994 eggs handled at this station. Of these 191 were discarded, and 14,803 set in incubators.

Of the eggs set, 9,341 proved to be infertile, contained dead germ, or otherwise failed to hatch, and 5,462 hatched. To these were added 13 seized by a warden when found in illegal possession. Of these 5,475 birds 1,300 were lost, 3,110 were liberated in covers, 815 turned over to clubs for wintering, and 250 are on hand November 30.

Of the 396 adults on hand at the beginning of the laying season 57 were lost, 149 distributed to covers, and 190 remain on hand November 30.

QUAIL BREEDING.—The year opened with 593 quail on hand (58 of the old brood stock plus 535 1931-hatched birds). Three pairs were exchanged in the late spring with the Rhode Island Commission.

Up to the beginning of the laying season, 79 birds were lost, 428 liberated in covers and 86 were on hand. (80 of these were for brood stock and 6 were wing-clipped and could not be distributed).

About the middle of April several nests and eggs were observed but none picked up until May 4. The last eggs were picked up during the week ending August 13. The fertility of the eggs was not as good as during the past two years.

A total of 3,164 eggs was collected, to which were added 21 brought to the station by wardens. The 3,185 eggs were set, of which 1,525 proved infertile, contained dead germ, or otherwise failed to hatch and 1,660 hatched.

To the 1,660 chicks hatched were added 8 hatched from eggs set under quail, and 3 brought to the farm by a warden, making 1,671 young birds handled. Of these 890 were lost, 720 distributed to covers, and 61 remain on hand November 30.

Of the 86 adults on hand at the beginning of the laying season 29 were lost and 57 remain on hand November 30.

*Sandwich State Game Farm—Harry A. Torrey, Game Bird  
Culturist in Charge*

NEW CONSTRUCTION.—In addition to an extensive program of repairs and replacements carried on at this farm, a concrete retaining wall was built around the service building on the quail area and the interior of the building completed. A water system operated by an electric pump was installed on the pheasant area. This replaced the old method of drawing water by hand for the care of the pheasants produced at the station, resulting in a substantial saving in labor charges.

NEW EQUIPMENT.—A second-hand No. 9 Mammoth Buckeye and a new No. 7 Buffalo electric incubator were added to the station equipment.

PHEASANT BREEDING.—The year opened with 400 pheasants on hand (222 of the old brood stock and 178 of the 1931-hatched birds).

Of these 5 were lost prior to the beginning of the laying season, leaving 395 (75 cocks and 320 hens) on hand. The first egg was picked up on March 30; the last on June 30.

A total of 8,864 eggs were collected, all of which were set in incubators and of which 3,523 proved to be infertile, contained dead germ, or otherwise failed to hatch, and 5,341 hatched of which 794 were lost and 4,547 reared.

Of the young birds reared, 3,834 were liberated in covers, 539 turned over to the sportsmen's clubs for wintering, and 174 are on hand November 30.

Of the 395 adults on hand at the beginning of the laying season 164 were lost or unaccounted for, the majority by vermin, 121 were released in covers, and 110 are on hand November 30.

QUAIL BREEDING.—The year opened with 715 quail on hand, 38 of last year's brood stock plus 677 of the 1931-hatched birds.

Prior to the laying season, 72 were lost mostly through fighting, and 559 released in covers, leaving 42 mated pairs.

The first eggs were picked up during the week ending May 7; the last during the week ending September 17. A total of 3,499 eggs were collected and set in incubators, 1,143 contained dead germ, were infertile, or otherwise failed to hatch and 2,356 hatched. Of the birds hatched, 254 were lost, and 2,102 were reared. 1,651 were distributed for liberation and 451 remain on hand November 30.

Of the 84 on hand at the beginning of the mating season, 1 cock was sent to the Ayer State Game Farm, 9 were lost, and 74 remain on hand November 30.



*Wilbraham State Game Farm—Frederick W. Wood, Game Bird  
Culturist in Charge*

**NEW EQUIPMENT.**—The Petersime was exchanged for a No. 7 Buffalo electric incubator, and an additional Buffalo purchased, so that the station is now equipped with three up-to-date Buffalo electric incubators. The old Fordson tractor was replaced.

**PHEASANT BREEDING.**—The year opened with 483 pheasants on hand (263 of the old brood stock and 220 1931-hatched birds), all of which were range-clipped and carried through the winter in one of the large open range pens.

Losses of 33 during the winter reduced the brood stock to 450 (392 hens and 58 cocks), and during the last week in March the birds were transferred to the breeding cages and mated seven hens to each cock.

In April, 20 wing-clipped cock pheasants wintered by a sportsman were received and held until in condition to liberate. Two were lost and 18 released.

During May four of the hens died from gape worms. Thereafter the birds were watched carefully and nine that showed symptoms of the disease were segregated. Because of the disease, it was decided to release all of the brood stock after the breeding season.

Eggs were collected from April 3 to July 16 totalling 20,197, of which 1,680 were shipped to the Marshfield State Game Farm, 3,916 discarded and 14,601 set in incubators.

Of the 14,601 eggs set 6,419 proved to be infertile, contained dead germ, or otherwise failed to hatch, and 8,182 hatched, of which 1,873 were lost and 6,309 reared.

Of the 6,309 young birds reared, 5,123 were distributed for liberation in covers, 786 for wintering, and 400 have been reserved for brood stock.

Of the 450 adults on hand at the beginning of the breeding season, 8 were lost and 442 released in covers.

For next year's brood stock there are on hand 65 cocks purchased in November and 400 hens of the 1932-hatch.

**QUAIL BREEDING.**—The year opened with 661 adult birds on hand, (49 of last year's, 40 from the Marshfield State Game Farm and 572 of the 1931-hatched birds.) All of these birds were carried through the winter in elevated cages with wire bottom runs, which protect the birds from vermin, snow, floods, and contaminated ground.

Of the 572 1931-hatched birds, 501 were distributed prior to the laying season, 66 lost, and the 5 remaining birds were added to the 89 brood stock birds reported on hand at the beginning of the year. Of these 94 birds, 6 were lost, 8 distributed, and 80 were mated and placed in breeding pens.

This year 20 pairs of quail were carried in elevated cages on wooden platforms, and 20 pairs in the ground cages. There was less mortality among the birds in the elevated cages, and from them 1,880 eggs were collected, against 1,366 eggs taken from the birds on the ground. In view of this, next year all the breeding quail will be carried on platforms.

The first eggs were picked up on April 28; the last, on September 12, a total of 3,246 eggs being collected and set, of which 801 proved to be infertile, contained dead germ or otherwise failed to hatch, and 2,445 hatched.

The first hatch of the young quail was placed in the brooders on May 21. About the middle of July it was found that there were not enough brooders on hand to properly care for the number of chicks being hatched and it was necessary to almost double the number of birds carried in each brooder. This crowding resulted in considerable cannibalism during August.

Of the 2,445 quail hatched, 835 were lost, and 1,610 reared of which 1,150 were released in covers, 60 were transferred to the Ayer State Game Farm, and 400 remain on hand November 30.



Of the 40 pairs of breeders on hand at the beginning of the breeding season, 18 were lost and 62 remain on hand November 30.

## FISH AND GAME DISTRIBUTION

Early in the year a thorough study was undertaken of the system under which the stock produced at the game farms and fish hatcheries was being distributed. The existing practice was to allot the stock to the local fish and game associations, representatives of which received and planted it. This method, which involved dealing with more than 250 clubs, required a large amount of overhead work in the central office which was both unnecessary and unsatisfactory, and much duplication in stocking occurred. But the most serious defect in the system lay in the allocation to some extent at least, on the basis of club membership, an indefensible policy, for there is no direct connection between the biological conditions for providing hunting and fishing in a given community, and the number of sportsmen who see fit to join a club in that section. Therefore a plan was adopted whereby the stock is allocated to the various counties in proportion to the amount of water and cover suitable to receive such stock, and the distribution is done, according to a definite restocking program, by the wardens of the Division, with the cooperation of a committee from the sportsmen's clubs in the respective communities where the planting takes place.

To put the plan into effect, a conference was held in each county by the Supervisor of Distributions with representatives of the organized sportsmen of that county. At those meetings the waters and covers to be stocked during the entire year, were decided upon and the entire program was mapped out. Thereafter as stock became available for liberation it was distributed per plan. The system has worked satisfactorily, and, with minor changes shown by experience to be desirable, it will undoubtedly be permanently adopted.

After conferring with the Council of Sportsmen's Clubs of Massachusetts the Division also changed its policy of distributing brook trout in the early spring, just in advance of the trout season. The fish are now liberated in the late fall. This allows them to become better adapted to their surroundings before the opening of the fishing season; and, still more important, it makes it possible to rear an additional number of trout at each hatchery, with the same equipment.

**BROOK TROUT.**—There were distributed from the State hatcheries and from fish purchased or received as a gift, 122,862 fish 1 to 4 in.; 564,815 fish 4 to 6 in.; and 288,104 fish 6 inches and over.

At the close of the year there are on hand at all the stations, 285,625 fingerlings, 4,646 yearlings, and 450 adults.

**BROWN TROUT.**—From both the Sunderland and the Sutton State Fish Hatcheries, as well as from fish purchased, there were distributed 800 fry, 13,605 fish 3 to 6 in., and 57,205 fish 6 inches and over.

At the close of the year there are on hand at the Sunderland State Fish Hatchery 106,000 fingerlings, 300 yearlings, and 499 adults.

**RAINBOW TROUT.**—From both the Montague and the Sutton State Fish Hatcheries, as well as from fish purchased, there were distributed 29,775 fish 2 to 4 in.; 3,670 fish 4 to 6 in.; and 38,501 fish 6 inches and over.

At the close of the year there are on hand at both hatcheries mentioned above, 59,628 fingerlings and 2,410 adults.

**CHINOOK SALMON.**—In addition to the 43,475 fingerlings produced at the East Sandwich State Fish Hatchery, 4,800 were purchased and distributed during the year.

**SMALL-MOUTH BLACK BASS.**—The entire production of bass at the Palmer State Fish Hatchery (with the exception of 75 fingerlings and 6 adults distributed for display) was planted in suitable waters. In addition 3,347 were collected in the salvage operations and all but 26 of these distributed for display, were planted in suitable waters.

MUSKALLONGE.—The New York Conservation Commission furnished 25,000 muskallonge fry which were planted in various locations on the Connecticut River upon arrival.

WALL-EYED PIKE.—The United States Bureau of Fisheries furnished 225,000 wall-eyed pike perch fry, which were planted in suitable waters upon arrival.

BLUE GILLS, CRAPPIE, HORNED POUT, PICKEREL, YELLOW PERCH, WHITE PERCH, LARGE-MOUTH BLACK BASS.—Pond fish of various species were distributed to open waters, club rearing pools, and for display, study, and to the U. S. Bureau of Fisheries, as follows: From the Sutton Ponds, 118,376 blue gills, 309,462 horned pout, 23,539 crappie, 11,497 pickerel; 279,014 yellow perch. From the salvage units and miscellaneous salvage jobs, 8,900 blue gills, 18,875 crappie, 19,650 horned pout, 837 pickerel, 111,839 yellow perch, 54,905 white perch, 29 large-mouth black bass, in addition to the 3,347 small-mouth black bass already shown under another heading. From the Palmer State Fish Hatchery, 223 blue gills, 1,822 horned pout; 355 pickerel, 1,660 large-mouth black bass. From a sportsmen's club 1,981 pickerel were purchased and distributed.

## FISH DISTRIBUTION FOR THE PERIOD DECEMBER 1, 1931 TO NOVEMBER 30, 1932

(This table does not show stock transferred from one station to another, eggs exchanged with the U. S. Bureau or other State Commissions, nor does it show additions to brood stocks.)

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCTS (SEINED, PURCHASED, GIFT ETC.)			Grand total
	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	
Brook Trout:							
1-4 in.	82,862	—	—	40,000	—	—	122,862
4-6 in.	380,010	33,700	605	150,500	—	—	564,815
6 inches and over	261,258	3,000	344	23,402	—	—	288,004
Total Brook Trout	724,130	36,700	949	213,902	—	—	975,681
Brown Trout:							
Fry	—	—	800	—	—	—	800
3-4 in.	—	—	105	—	—	—	105
4-6 in.	12,000	1,500	—	—	—	—	13,500
6 in. and over	54,950	—	55	2,200	—	—	57,205
Total Brown Trout:							
Fry	—	—	800	—	—	—	800
Fish 3 in. and over	66,950	1,500	160	2,200	—	—	70,810
Rainbow Trout:							
2-4 in.	29,700	—	75	—	—	—	29,775
4-6 in.	3,670	—	—	—	—	—	3,670
6 in. and over	35,985	—	16	2,500	—	—	38,501
Total Rainbow Trout	69,355	—	91	2,500	—	—	71,946
Chinook Salmon:							
3-6 in.	43,475	—	—	4,800	—	—	48,275
Small Mouth Black Bass:							
Fry up to one in.	175,000	—	—	—	—	—	175,000
1 to 5 in.	35,900	—	75	—	—	—	35,975
6 in. and over	—	—	—	131	—	6	137
12 in. and over	—	—	6	3,190	—	20	3,216
Total Small Mouth Black Bass:							
Fry up to 1 in.	175,000	—	—	—	—	—	175,000
1 in. and over	35,900	—	81	3,321	—	26	39,328
Large Mouth Black Bass:							
Under 6 in.	1,660	—	—	—	—	—	1,660
Over 6 in.	—	—	—	5	—	—	5
Over 12 in.	—	—	—	24	—	—	24
Total Large Mouth Black Bass	1,660	—	—	29	—	—	1,689
Blue Gills:							
Under 6 in.	117,898	—	175	6,750	—	—	124,823
Over 6 in.	510	—	16	2,150	—	—	2,676
Total Blue Gills	118,408	—	191	8,900	—	—	127,499
Crappie:							
Under 6 in.	22,686	—	30	7,680	—	—	30,396
Over 6 in.	690	—	133	11,170	—	25	12,018
Total Crappie	23,376	—	163	18,850	—	25	42,414
Horned Pout:							
Under 6 in.	253,270	1,000	25	960	—	—	255,255
Over 6 in.	56,279	50	660	15,368	—	551	72,908
Over 12 in.	—	—	—	2,712	—	59	2,771
Total Horned Pout	309,549	1,050	685	19,040	—	610	330,934
Pickarel:							
Under 6 in.	2,871	—	24	496	—	—	3,391
Over 6 in.	8,635	75	247	1,561	—	—	10,518
Over 12 in.	—	—	—	754	—	7	761
Total Pickarel	11,506	75	271	2,811	—	7	14,670



(Continued)

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCT (SEINED, PURCHASED, ETC.)			Grand total
	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	
Yellow Perch:							
Under 6 in.	222,985	6,000	112	23,094	—	—	252,191
Over 6 in.	48,535	750	632	85,375	—	50	135,342
Over 12 in.	—	—	—	3,320	—	—	3,320
Total Yellow Perch	271,520	6,750	744	111,789	—	50	390,853
White Perch:							
Under 6 in.	—	—	—	14,595	—	340	14,935
Over 6 in.	—	—	—	39,920	—	50	39,970
Total White Perch	—	—	—	54,515	—	390	54,905
Wall-eyed Pike Perch:							
Fry	—	—	—	225,000	—	—	225,000
Muskallonge:							
Fry	—	—	—	25,000	—	—	25,000
Total Trout and Pond Fish:							
Fry	175,000	—	800	250,000	—	—	425,800
1 inch and over	1,675,829	46,075	3,335	442,657	—	1,108	2,169,004

In addition the following were distributed during the period December 1, 1931 to November 30, 1932.

Sunfish	6,471	—	73	795	—	15	7,354
Crawfish	3,000	—	—	—	—	—	3,000
Fadpoles	53,755	—	—	—	—	—	53,755
Carp	—	—	—	—	—	3	3
Suckers	—	—	—	600	—	—	600

**PHEASANTS.**—Instead of following the practice of other years of distributing most of the pheasants produced at the game farms to the local sportsman's clubs to care for during the winter, this year nearly all the pheasants produced were liberated at ten weeks of age in accordance with the new distribution policy.

There were 10,175 eggs distributed to applicants of which 2,943 hatched. Of these 94 are being carried through the winter, and 981 were released under the supervision of our wardens in the covers decided upon at last spring's conferences. This makes a total of 1,075 birds produced in this branch of the work.

There were 16,328 young and 1,225 adult pheasants distributed from the game farms either directly to covers or to the clubs for wintering. (See table). In addition 2,392 young and 221 adult pheasants purchased were released in covers.

At the close of the year there are on hand at the four game farms, 930 1932-hatched birds and 581 adults.

**QUAIL.**—There were 4,071 young quail and 1,715 adult quail distributed either to open covers or for breeding. (See table).

At the close of the year there are on hand at the four game farms 1,400 1932-hatched quail and 216 adult quail.

**WHITE HARES.**—There were 4,142 live hares imported after the close of the Massachusetts' season and these were all released in open covers.

**COTTONTAIL RABBITS.**—Penikese Island supplied 446 live cottontails for restocking the mainland. In addition, 80 were trapped on closed areas, and 21 were purchased from an out-of-state trapper. These were also released in suitable covers.

## GAME DISTRIBUTION FOR THE PERIOD DECEMBER 1, 1931 TO NOVEMBER 30, 1932

(This table does not show stock transferred from one game farm to another, nor does it show additions to brood stock.)

	PRODUCT OF STATE GAME FARMS				NOT PRODUCT OF STATE GAME FARMS*		Total
	Distributed for hatching	Liberated direct to covers	Wintered by clubs and others for liberation in spring of 1933	Distributed for breeding	Liberated direct to covers	Distributed for Study, exhibit, breeding, etc.	
Pheasants:							
Eggs	10,175	-	-	-	-	-	10,175
Young (reared by clubs and others from the 10,175 eggs reported above as distributed for hatching)	-	981	94	-	-	-	1,075
Young	-	13,618	2,710	-	2,392	-	18,720
Adult	-	1,225	-	-	221	-	1,446
Quail:	-	4,071	-	-	-	-	4,071
Young	-	1,695	-	20	-	-	1,715
Adult	-	-	-	-	-	-	-
Cottontail Rabbits:	-	446	-	-	101	-	547
Adult	-	-	-	-	-	-	-
White Hares:	-	-	-	-	4,142	-	4,142
Adult	-	-	-	-	-	-	-

\* Purchased, gift, trapped, etc.

## MARINE FISHERIES

## GENERAL

The work of the Division pertaining to the marine and coastal fisheries of the State is under the personal supervision of the State Inspector of Fish and the State Supervisor of Marine Fisheries, both of whom are statutory officials serving under the Director.

The work of both of these units has been restricted, due to lack of funds and personnel.

In the case of the State Inspector of Fish there are but four deputies to inspect all of the fish landed at the important ports of entry and to cover two thousand retail markets throughout the State. To properly handle this work, at least two more deputies should be appointed, one of whom would inspect the ports of entry in the southeastern part of the State and the other should assist in a more regular inspection of the retail markets.

The outstanding need of the State Supervisor of Marine Fisheries is an additional warden force to assist in the patrol of the contaminated shellfish areas, particularly to supervise the digging of the shellfish in those areas in cases where they are to be taken to chlorination plants before being offered to the public for food.

If the chlorination of shellfish from the contaminated areas is to continue, it is essential that the work be supervised by wardens who are employed and compensated by the Division. The cost of this service might be charged, through a permit system, to those who acquire the privilege of taking shellfish from the contaminated areas.

At least one additional power boat is necessary to adequately enforce the laws on the coastal waters of the Commonwealth.

Realizing that funds may not be available for enlarging any branch of the Division's activities at the present time, it is hoped that through a coordination of the efforts of the units engaged in marine fisheries work, the Division will be able to do better work in the interest of this particular industry during the coming years.

## STATE INSPECTOR OF FISH

Upon this office is placed the duty of seeing to it that only fish fit for food shall reach the fish-consuming public. It is a large proposition, and



one, the enforcement of which is limited only by the number of men used in the work and the amount of money placed at the disposal of the office for pursuing its endeavors.

The work entails the inspection of all retail stores in this State, some two thousand in number, selling fish, either fresh or frozen, to the public. It also includes inspection of all wholesale concerns selling fish (including, of course, the big fish marts at Boston and Gloucester); fish in public freezers; peddlers' carts; all fish foods of any kind arriving at Massachusetts ports from any foreign country (including the almost daily importations from Nova Scotia, the entire handling of the great lobster industry with headquarters at Boston and Gloucester, and the importations of fresh swordfish from Nova Scotia and frozen swordfish from Japan). These are the high points in the daily routine.

One of the most important branches of the work is the inspection of retail stores throughout the whole State. This is considered important because it comes closer to the actual buyer and consumer of fish than any other branch. The work has been carefully done, the inspections have been more numerous than last year, the number of court cases resulting therefrom greater, and not one case was lost.

Probably the most serious and intensive part of the work is the inspection of fish in bulk at the points of arrival, that is, the inspections at the wholesale fisheries concerns and the inspections aboard the vessels which bring in the fish, the idea being that the more fish unsuited for food that can be stopped at the source, the better it is for the public which buys at retail. This wholesale inspection includes not only the local wholesale dealers and the local vessels, but also the great influx of goods from Nova Scotia, and at times from other countries.

One feature especially commands our attention, and that is the importation of swordfish. From Nova Scotia this year have come in larger quantities than ever before, shipments of these much desired fish. At least ten cargoes have arrived besides the usual shipments by steamer. As during last year, frozen swordfish were brought to the port of Boston by Japanese steamers direct from Japan via the Panama Canal, and landed next door to the Boston Fish Pier. There have been some six lots of these fish and their condition has been better than last year, the Japanese shippers evidently having learned the lesson that Massachusetts desires and will take only good fish.

One section of the work which has grown to great prominence in the past two years is the inspection of lobsters. This work, which is the result of concerted action in April of 1931, has brought about a state of affairs that is giving to the public consumer of this most delicious food, a feeling that they are getting something that is "all right." The importations from Nova Scotia have been larger than ever before, and the Nova Scotian government has subsidized crafts to bring cargoes to Boston, which is the largest lobster center in the world. During the past year one of the great concerns has moved its base to Gloucester, thus broadening the inspection survey on these crustacea. It might be added that Lynn now has two concerns, Beverly one and Salem one. It should be said here, speaking generally, that the office is receiving from the wholesale lobster dealers a cooperation without which the work of inspection would be doubly hard, and in a measure possibly unsatisfactory.

The main problem in lobster inspection has been how best to determine how long a lobster remains fit for food. To ascertain this, the Division last year engaged the services of Dr. David L. Belding, who reported on June 1 of this year under the title, "A New Standard for the Inspection of Lobster Meat." Following this, Dr. Belding met with the Director, the Inspector of Fish, and his deputies, and demonstrated, by means of electrical apparatus, many of the points which he desired to bring out in his report to show that lobsters, while giving evidence of death, were really living. This was followed, on July 22, by a demonstration before lobster fishermen, lobster dealers, representatives of the Department of Con-



servation, the Boston City Board of Health, and others vitally interested in this report and its findings. At this meeting a divided sentiment developed concerning Dr. Belding's report.

Since this meeting the Director, the Inspector of Fish and his deputies have carefully considered the adaptability of the points in the report to actual law enforcement, and while feeling that there is much to be said in favor of the report and the results that might be obtained from following some of its conclusions, they are of the opinion that more mature thought is necessary before the standards recommended by Dr. Belding can be adapted to practical fish inspection work.

Another important part of the work of this office is inspection of fish for filleting purposes and the inspection of houses preparing fillets for the local and national trade. This is a work which calls for quick and careful judgment, and this year for the first time has been extended by giving daily inspections to all plants engaged in the process of filleting fish. While there is a desire evidenced by most of the concerns to put upon the market a flawless article, there have been occasions when some goods bought for or being prepared for filleting are not in accord with the fish inspection laws. These cases have been, as far as possible, met at the source and stopped, but this only accentuates the need of continued inspection in this line of work. The office this year has been enabled to give more attention than ever before to the lobster and fillet situation because of appointment of an additional inspector (Mr. William H. Brogan, whose provisional appointment of 1931 was made permanent July 11 of this year). He was immediately assigned to lobster and fillet work.

Within the scope of its appropriation and the limitations of its force it is felt that the work of this office has been fairly done, but in all justice it should be said that in order that the great objective of the work may be attained, more money and more men are necessary. However, it is realized that conditions are such at the present time as to preclude any extension of money and men, and therefore no recommendations for such are made.

The following brief paragraphs (which by no means cover all the work done), do include many high points and give indication of the major work of the office:

Inspections in retail stores, 4,890.

Inspections in wholesale stores, 33,255.

Freezer inspections, 310.

Inspection of peddlers' carts, 200 weekly.

Inspections at Yarmouth, N. S., steamer, 118.

Vessel inspections at Gloucester, 2,388.

Total fish condemned at Gloucester, 183,410 pounds.

Ground fish condemned at Boston Fish Pier from fishing vessels, 149,784 pounds.

Condemned at Boston, graded as jellied, from consignments on Yarmouth, N. S. steamer, 167 swordfish (which weighed 47,176 pounds).

Graded at Boston Fish Pier from arriving vessels as No. 3 fish, 435,691 pounds, mostly haddock and codfish, which therefore did not reach the retail markets of the State for home consumption as fresh fish.

Fish condemned at retail stores, 3,340 pounds.

Condemned, landed at Boston from Canada by rail and steamer, 1,585 pounds salmon; 1,806 pounds smelts; 1,279 pounds scallops; 6,730 pounds mackerel; 31 pounds pickerel.

Condemned, landed at Boston Fish Pier arriving by rail, 3,955 pounds miscellaneous fish.

Condemned, graded as "jellied", landed at Boston Fish Pier, direct, 192 swordfish (which weighed 48,670 pounds).

Inspected, arriving in Boston direct from Japan in Japanese steamers,

7 consignments of frozen swordfish, 283,966 pounds.  
Condemned, at landing and since from cold storage, from the above Japanese consignments, 121 swordfish (which weighed 34,388 pounds.)  
Total swordfish condemned, 480 fish (weighing 130,234 pounds).  
Inspections in wholesale lobster stores in Boston, Lynn, Beverly and Gloucester, 4,194.  
Inspections on subsidized Nova Scotian lobster boats arriving at Boston and Gloucester, 36; pounds condemned, 61,590.  
Lobsters condemned from Yarmouth, Nova Scotia steamer, 33,465 pounds, other Nova Scotian crafts, 98,081 pounds.  
Total Canadian lobsters condemned, 193,136 pounds.  
Total lobsters condemned from Massachusetts and other New England States, 28,767 pounds.  
Grand total of lobsters condemned, 221,903 pounds.  
Total fish condemned at Boston Fish Pier and at Boston from Canada by rail and steamers, 295,404 pounds.  
Total inspections, 45,398.  
Total fish condemned, 482,154 pounds.  
Total court cases, 26.  
Total convictions, 26.

#### STATE SUPERVISOR OF MARINE FISHERIES

A general feeling of optimism prevails among the fishermen who are closest in touch with the marine fisheries, despite the fact that in the principal branch of the fisheries,—the vessel fishery—there was a decrease last year of more than five million pounds in the catch and more than three million dollars in the value of the output from the previous low record of 1931, and the further disheartening reports from all other fisheries, which brought the total estimated loss in value to more than four and one-half millions of dollars. Why this feeling persists is not so difficult to see. Accustomed to the fluctuations in the annual harvests of the sea the careful observer can easily discern the early currents of the returning tide of better times as reflected in the industry itself.

The general depression has not been without its beneficial effects. Everywhere, in all branches of the fisheries, readjustments are being made or considered. Wasteful practices in catching, preparing for market, and even in the details of marketing itself, which in more prosperous times went unchallenged or were looked upon as necessary losses, are now being scrutinized with great care, and the reaction from the very fact of discussion is bound to bring about important changes which will be of great benefit to the fisheries when normal times return.

For the present there need be no pessimism as to the abundance of fish in the sea. To be sure, the catch of large haddock has shrunk to about half that of 1930, but this is offset by the amount of scrod size, the number of which has more than trebled in the same period. The mackerel catch was increased by some six million pounds, and where a decrease of other fish has occurred, seasonal changes have been largely responsible.

But this optimism should not prevent the curbing of wasteful practices. One particularly harmful practice which has been stopped in certain areas by legislative enactment is the use of beam and otter trawls in coastal waters. Whatever reasons there may be for obtaining fish in this manner from offshore fishing banks, they do not apply to the near shore areas. Disturbing the bottom along the shores destroys valuable feeding and spawning grounds. Millions of young fish too small for market are caught and killed in the drags. European countries have long ago realized the damage done to the inshore fisheries by this method of fishery, and have prohibited it. A good start has been made in prohibiting trawling along the North Shore. It is the Division's opinion that it should be prohibited in all waters within the jurisdiction of the State. Line trawling could



be substituted within this area and would result in a great saving of small fish and in providing employment for many more persons.

Attention is directed to the following accomplishments of the marine section of the Division, detailed accounts of which will be found in the body of the report, namely, the large number of permits issued for the conservation of various shellfish; the great quantities of starfish, totalling 43,126 bushels, which have been removed from upper Buzzards Bay; the cooperation with towns in planting and protecting seed shellfish; and the record of enforcement of the laws relating to marine fisheries.

### *Enforcement of Marine Fisheries Laws*

In addition to the nine regular coastal fish and game wardens and the two local inland wardens on the islands of Martha's Vineyard and Nantucket who also enforce the marine fisheries laws, sixty-two deputy wardens were appointed. These served without pay from the State and were assigned for special work, under the regular wardens, as follows,—twenty-one to supervise the digging and transferring of clams from the contaminated area to the chlorinating plants; eighteen to assist in the enforcement of lobster laws; twenty-three for general purposes. Four deputy wardens were employed on salary for a short time to assist the regular wardens in certain districts where an additional man was required.

A special appropriation made possible the purchase of a boat for enforcing the marine fishery laws. The boat, renamed the "Wanderer," is a cabin cruiser type thirty-eight feet long, equipped with a two hundred horsepower Sterling Petrel motor, and capable of more than twenty knots. Since it was put in commission on August 1, over 200 boats have been inspected, some fifty cases have been brought into court, mainly for dragging in restricted areas, with fines totalling \$660. Illustrating what such a boat can accomplish, on a few hours' run on two days late in August, 68 lobster fishermen were inspected on the fishing grounds (resulting in three court cases), a considerable area restricted from flounder dragging was patrolled, and more than one hundred miles were covered. The boat has covered all districts except Martha's Vineyard and Nantucket. Due to the long and peculiar shore line of the State, which is divided by Cape Cod, it is not an economical proposition to use one boat to work on both northern and southern shores. At least two boats are essential for adequate enforcement of laws and protection of our marine fisheries.

The district court work for the year was as follows: number of cases prosecuted, 417; district court convictions, 392 (of which 72 were filed and 20 appealed to the Superior Court); discharged, 25; fines imposed in district court, \$4,536.

The above cases may be grouped thus—taking shellfish from contaminated areas, 241, fines \$2,860; possessing undersized shellfish, 29, fines \$123; violation of lobster laws, 72, fines \$768; violation of crab laws, 2, fines \$10; violation of scallop laws, 19, fines \$150; dragging in restricted areas, 31, fines \$465; torching herring 10, fines \$130; violation of alewife laws, 7, fines \$10; taking shellfish from private grants, 4, no fines; obstructing an officer, 2, fines \$20.

No changes in the marine fisheries laws are recommended, for the reason that the report of the unpaid special commission to revise the laws relative to marine fish and fisheries, including shellfish, is still pending in the Legislature.

### *Shore Fisheries*

From reports of the shore net and pound fishermen required by Section 148, Chapter 130 of the General Laws, were secured the following data; number of men engaged, 256; number of boats, 105; value of boats, \$44,268; number of traps and weirs set, 204; value of traps and weirs, \$198,286; value of other shore and accessory property, \$163,905; total value of equipment, \$406,459; amount of fish caught, 16,676,781 pounds; value of fish, \$276,280.



Permits (from town officials) were held for 341 pieces of apparatus classified as follows:—184 weirs, 119 fykes, 33 floating traps, 3 seines, and 2 clam traps.

Except in certain spots, the catch of this branch of the fishery was a little better than the average for the past two or three years with prices very low. An unusually large amount of young fish was reported. Tons of scup, butterfish and porgies were released from the traps because of no demand. There were more mackerel, sea bass and squid. A considerable falling off in catch of eels and tautog was attributed to the scarcity of eelgrass which changed their places of schooling, rather than to a less quantity of the fish. Tinker mackerel were reported in almost unprecedented quantities off the Cape shore. The September gales, particularly on September 8 and 9, destroyed or damaged a large amount of equipment.

There is a wide-spread belief that dragging should be stopped in all coastal waters. The fishermen are confident that with the return of normal times and prices this fishery will quickly be restored and feel that there is a greater need for extension of markets rather than for a greater abundance of fish.

### *Lobster Fishery*

In conformity with law, 9,664 egg bearing lobsters were purchased, at a cost of \$5,992.60, punched, and liberated as nearly as possible in the localities where they were taken. The fishermen report that 23,045 additional egg lobsters were liberated by them without cost to the State. Sixty-seven permits were issued to open lobsters and sell the meat out of the shell.

From international and interstate shipments 35,546 live short lobsters and 3,718 egg lobsters were seized and liberated in the waters of the State from Salisbury south to Buzzards Bay.

The number of shorts seized was larger than last year by almost 14,000, and was the largest number, with one exception, ever seized in any one year. The number of egg lobsters seized was more than double the entire amount confiscated by the State since the practice began in 1915. Most of these egg lobsters were taken from shipments from New Brunswick, and were of large size.

In the early fall a small number of egg lobsters bought from Massachusetts fishermen were tagged and liberated at New Bedford and Woods Hole for the purpose of learning how long they would remain in the shore waters. To date a very few of these tags have been returned.

Commenting on the season's catch of lobsters, certain points may be emphasized. First, the reports given in tabular form below are far from accurate. In the last two years a much larger number of these reports than ever before have been received, and the responses have been much more prompt. There is a hesitancy, however, among the fishermen in submitting figures for fear that these returns may either find their way into tax board records or would result in increasing competition. Efforts are being made to overcome this feeling, and assurances given the fishermen that these reports are strictly confidential and used only for statistical purposes.

A study of these reports and careful inquiry have, however, revealed the following features of the season. The catch of lobsters was considerably less than in 1931, particularly in the early part of the year. This decrease in catch seems to have been a peculiarity of the season rather than an actual decrease in the abundance. Lobsters did not school in the usual places nor in the same abundance, due probably to warm or moderate weather, plenty of natural food, and to a less extent lack of eelgrass and the quantities of dead eelgrass which disturbed the bottom conditions. Early in the fall, quantities of small lobsters seven to eight inches in length were observed along the southern shore of the State. Abundance

of lobsters was also reported north of Cape Cod. Egg lobsters were not nearly as plentiful as usual. As pointed out in previous reports, the egg lobsters must be more thoroughly and carefully protected if the lobster industry is to be conserved to the fullest extent.

Further tests of the tank system of keeping lobsters were made through the courtesy of one of the large cold storage companies in Boston, which furnished facilities for circulation and cooling of water. The large number of shorts and egg lobsters handled through this method and the extent to which they become revived by treatment was commented upon by commercial dealers who visited the plant. Through the interest created by the work and the encouragement and advice given, more than 100 tanks have been installed in Massachusetts by lobster handlers, and more are contemplated. The principal accomplishment of the experiments was to emphasize the beneficial effect of cooling the water to a temperature between 48 deg. to 52 deg. and to indicate the minimum amount of water required. The cleanliness of the system and the facilities for ready inspection and observation of the condition of the lobsters at all times is a specially strong point for the method. Lobsters apparently thoroughly exhausted by long shipments under adverse and unnatural conditions have revived to almost unbelievable vigor in the comparatively short time of two or three hours. As little as four gallons of cooled water per minute have been repeatedly found sufficient for a tank 5 ft. x 10 ft. x 14 in. deep in comparison with 12 to 25 gallons per minute of uncooled water frequently used by commercial dealers in a similar sized tank. Various arrangements for circulating the water have been tried out, almost any one of which would be practicable if intelligently adjusted to suit the conditions of the individual plant. The experience gained by the Division is available to those interested.

As required by Chapter 130, Section 106, General Laws, it is reported that 1,132 lobster licenses were issued during the fiscal year. Out of an active list of 1,108 lobstermen, 1,054 have reported on the season's catch as required by law. The following tabulation has been made from those reports, and covers the period from Oct. 1, 1931 to Oct. 1, 1932.





### *Sea Crab Industry*

A general feeling of optimism prevails among the crab fishermen as to the future supply of this crustacean. A large majority reported that this past year crabs were found in the same abundance as in the past five years, and many believe that there was a distinct increase. Among the reasons given for this continued abundance, the one most usually mentioned was the practice of returning all female crabs to the water, since the market does not desire them. There appeared to have been an unusually large number of young crabs throughout most of the area, and although the pots are so constructed as to allow most of these to escape, as many as 300 small to 15 of market size were reported from one pot. During July and August in favorable localities about 75% of the catch of adult crabs were females in "sponge"—i. e. with eggs.

The recommendation most universally advocated by the fishermen for further improvement of the industry was the establishment of a close season from December 1 to April 30. The aim of this plan is to give protection to the "soft" crabs and to permit them to "fill out" before they are caught. The principle of this recommendation is endorsed by the Supervisor. As in all other food products the price of crabs was distinctly lower.

Sixty-five crab licenses were issued by the town clerks as compared with 54 last year. Reports from 43 licensees showed the following condition of the fishery: men, 43; number of boats, 40; value of boats, \$15,100; number of pots, 1,915; value of pots, \$5,006; total equipment value, \$20,469; number of crabs taken, 4,197,750; value, \$21,786. The output of crab meat in Massachusetts was approximately 125,000 lbs., with a market value of \$93,750.

### *The Mollusk Fisheries*

**STARFISH EXTERMINATION.**—The general facts of the extensive damage done to shellfish by starfish, the tremendous amount of starfish in Buzzards Bay, and the need of State aid to assist the towns in combating this menace to the shellfisheries, were outlined in last year's report.

The legislature this year recognized the gravity of the situation by appropriating \$15,000 for the extermination of starfish in the waters of Buzzards Bay, Vineyard Sound and Nantucket Sound. Under the provisions of the act (Chapter 244, Acts of 1932) the Division is authorized and directed to aid such towns in the infested areas as have appropriated one-quarter of the total cost, and the rules and regulations for conducting the work are to be determined by the Division.

Immediately thereafter the Supervisor of Marine Fisheries called a conference of the selectmen of the towns principally affected and a plan of action was agreed upon. It was decided to arrange the expenditure so as to use virtually the entire appropriation in the purchase of starfish on a per-bushel basis, directly from the fishermen.

After considering methods used elsewhere in such work, such as cotton tangles or "mops", use of copper sulphate, etc., it was decided the method best adapted to the conditions existing in Buzzards Bay was dredging with a light scallop dredge. This plan was particularly advisable since all fishermen were already equipped with this type of dredge. Furthermore by its use a minimum amount of damage would be done to the shellfish beds, as there was only a relatively small number of scallops or other shellfish remaining. Very rapid collection would also be made through this plan.

In the collection and disposal of the starfish the procedure adopted has been to dump the contents of the dredges upon a culling board, pick the starfish as clean as possible from the debris and carefully throw back all seed scallops which may have been taken in the catch. The starfish are then piled up in the boat and at the end of the day's catch are taken to the designated landing place. By this time the starfish are tightly matted

together and the heap must be broken apart before the starfish can be shovelled into baskets for hoisting ashore. The measuring is done by the town officer selected for supervising the collections. A voucher is prepared, which is signed by the fisherman, who is also given a copy.

The day's collection of starfish is either carted away and buried or taken by local farmers to spread on their fields as fertilizer. Bringing the starfish ashore is a very necessary part of the program of destroying them. The former practice of the fishermen in tearing them apart and then throwing the mutilated remains back into the water was not beneficial inasmuch as the starfish will quite rapidly restore the injured part by growing on new arms or "fingers" as they are often called.

Keeping in close touch with the collections, the price per bushel was kept at a minimum. In the summer months when the starfish were off shore in the deeper waters the fishermen were paid 35c per bushel. Then, as the starfish moved into the nearer and shoaler areas in the fall and were therefore easier to obtain, the price was reduced to 25c per bushel, and later on to 15c which was the price prevailing at the close of this report in the areas most infested.

The short period of collection has shown that the situation had not been exaggerated, for since July 7, when State collection began, up to November 30, 43,126 bushels had been collected in the waters of four towns in upper Buzzards Bay by the State, in addition to 12,993 bushels collected through efforts of the local towns or a total of 56,119 bushels. This represents approximately 16,835,700 individual starfish. Two-thirds of this quantity were brought in by the fishermen in September and October. In Wareham, which is particularly infested, in one day (November 16) 31 boats collected 2,558 bushels (average  $82\frac{1}{2}$  bushels), and 9 secured more than 100 bushels for their day's catch. In other towns as many as 175 bushels were secured in one day by a single boat, and frequently 100 bushels was exceeded. The Division has taken cognizance of all the facts in the collection, its marine biologist, who has charge of the work, has studied them, and is of the opinion that, provided an additional appropriation can be obtained this coming year so as to bring the total amount near the original estimate of \$25,000, the starfish will be reduced in this section to such an extent as to restore the shellfish industry there to its annual million dollar potential value. The benefit would, therefore, be many times the cost of suppression. Lasting results, however, are no more to be expected in this work than can it be hoped to permanently exterminate the weeds on our farms. Only persistent, continued efforts will avail. This the Division realized from the beginning, and consequently its first requirement made of the towns which desired State assistance in starfish control, was that they adopt a regulation compelling the fishermen to bring ashore all starfish taken, under penalty of having their shellfish permits revoked. The Division believes that these town regulations should be supplemented and supported by a State law.

The work thus far has been carried on only in the towns of Mattapoisett, Marion, Wareham and Bourne. Quite recently, however, Edgartown and Nantucket have had their shellfish areas inspected by the Division, and without doubt other towns will also request State assistance. Certain other towns—such as Swansea—not coming within the scope of the law have a starfish problem which is greatly depleting their shellfish. Similar relief should be afforded these towns. It is much too early to judge the benefits which have resulted from the removal of so many millions of starfish in upper Buzzards Bay. Already, much to the surprise of the most optimistic, scattering beds of seed scallops are showing up in those areas from which the largest amounts of starfish have been removed. The fishermen are finding it a little more difficult to secure paying quantities of starfish, and the Division itself is shifting its tactics from quantity collection to collection designed more specifically to protect certain natural beds of seed scallops.



To the close of the year State funds to the amount of \$8,711.20 have been spent. The following table summarizes the collections by both towns and State.

STARFISH COLLECTIONS

TOWN	Bushels bought from town appropriations	Bushels Bought from State Appropriation					Bushels bought from State appropriations	Total of bushels bought by both towns and State
		July	August	September	October	November		
Bourne	1,469 ½	—	—	757	345	3,984 ½	5,086 ½	6,556
Marion	2,075	1,989	589	320	3,863	5,094	11,855	13,930
Mattapoisett	1,849 ½	—	—	2,071	3,810	2,062	7,943	9,792 ½
Wareham	7,599	382	8	6,268	2,609	8,975	18,242	25,841
	12,993.	2,371	597	9,416	10,627	20,115 ½	43,126 ½	56,119 ½

**SHELLFISH PERMITS.**—Permits to handle shellfish were issued to the number of 671, classified as follows: 426 to dig clams from the contaminated areas for the purification plants; 10 to transport shellfish from polluted to clean areas; 161 to take shellfish from contaminated areas for bait purposes; 72 to take shellfish less than 2 inches in length for transplanting; 2 to take scallops from shallow to deeper water.

The total amount of shellfish salvaged under these permits was—clams, 117,487 bu.; seed clams, 1,500 bu.; quahaugs, 1,468 bu.; seed quahaugs, 780 bu.; little necks, 6,400 bu.; scallops, 2,500 bu.; oysters, 1,100 bu. Total value, \$202,078.

**CLAM.**—From the contaminated areas 38,580 bushels were sent to the chlorinating plants at Newburyport and Plymouth for purification. 426 men were engaged and 2,426,542 square feet were dug over. The plant at Newburyport operated for the entire year, and a total of 10,903 barrels were purified from contaminated areas in Salisbury, Newburyport, Newbury, Winthrop and Quincy. The Pioneer Fisheries Company of Plymouth operated over a period of 4½ months and purified a total of 1,957 barrels from areas in Boston, Hull, Quincy and Plymouth.

As a result of conferences by the Supervisor with selectmen and interested local citizens, various towns have taken renewed interest in their shellfish, and 1,500 bushels of seed clams were planted this year in certain depleted areas. A very good growth has been reported. In addition to encouraging the planting of clams, a survey is being made of the various areas for the purpose of listing the local shellfish problems so that they can be more successfully combated.

**QUAHAUGS.**—Very good sets of quahaugs occurred generally all along the southern shore. The sets were particularly large in Barnstable, Falmouth, Mashpee, Yarmouth, Dennis, Brewster, Chatham, Orleans, Eastham, and Wellfleet. In addition to the natural set 780 bushels of seed was planted and 7,800 bushels of large quahaugs and little necks were transplanted from polluted to clean areas.

### *Fishways*

The chain of fishways in the Parker River functioned even better than last year. The obstructions in the twelve miles of this stream were successfully passed by many thousands of alewives and in the early fall quantities of young were observed making their way back to the sea. Next year will complete the three year cycle—from hatching to return of adult fish—and it is confidently expected that an extraordinary run of alewives will occur. Except for minor adjustments and repairs the fishway withstood the unusual amount of high water which prevailed this year.



Other fishways were inspected by coastal wardens and minor repairs and adjustments were made which enabled a much larger number of alewives to ascend to headwaters. The balance of last year's small special appropriation for fishway improvement was used in the Taunton River system in clearing out obstructions and in repairing certain fishways which were not functioning properly. A particularly complete repair job was done at Middleborough. Due to unusual high water conditions repairs being made in the Lawrence fishway have been temporarily halted.

The following fishways have been examined and found to be in need of repairs or alterations in design: Waukinco River fishway, Horseshoe Works fishway in Bridgewater, Bournedale fishway, and North Falmouth fishway.

### *Bounty on Seals*

The following towns were reimbursed by the Commonwealth (through the county treasuries) for bounties of \$2 each paid on 247 seals in accordance with Section 155, Chapter 130, General Laws: Cohasset, \$4; Duxbury, \$24; Eastham, \$2; Dennis, \$10; Essex, \$28; Hingham, \$20; Ipswich, \$80; Kingston, \$66; Lynn, \$14; Newburyport, \$2; Oak Bluffs, \$2; Orleans, \$2; Plymouth, \$6; Provincetown, \$4; Quincy, \$12; Rockport, \$2; Rowley, \$6; Sandwich, \$6; Weymouth, \$34; Yarmouth, \$170; fees to town treasurers, \$123.50. Total, \$617.50.

### *Note of Appreciation*

The Director acknowledges his indebtedness to the officials and employees of the Division for their earnest cooperation and faithful service during the past year. It was largely through the efforts of those who labored in the office and in the field that the accomplishments enumerated in this report were made possible, and the Director wishes to give the credit where it is due.

Respectfully submitted,

RAYMOND J. KENNEY,  
*Director, Division of Fisheries and Game.*

## APPENDIX

### A PRACTICAL METHOD FOR THE DISINFECTION OF FISH OVA AGAINST FURUNCULOSIS

The following experiment was carried out during the fiscal year:

Recognizing that fish ova represent a possible vehicle for the transmission of Furunculosis, it was deemed necessary to develop a practical technique for their disinfection to eliminate a very real source of reinfection of trout hatcheries. While it is not thought that eggs, carrying external infection acquired either in passage through or from implements previously infected, will of themselves develop into infected fish, it is evident that bacteria from these eggs will be disseminated into the water of the hatchery and in this way, and through infected implements, may infect the entire hatchery.

Experiments were made at three of the State Fish Hatcheries, namely, Sandwich, Palmer, and Montague, and the number of eggs hatched and fish reared will be found under each station in the Propagation Section of this report. For this work, Diamino-methyl-acridinium chloride (Acridine neutral) was used and this was reported as a satisfactory chemical disinfectant for fish ova by Dr. Isobel Blake of the Fishery Board for Scotland (Fisheries, Scotland, Salmon Fish., 1930, No. II).

## EXPERIMENTAL

At the laboratory solutions were made up in three dilutions—1:1000; 1:1500; and 1:2000. About 2,500 eggs were placed in each of four beakers and three lots were covered with the three dilutions of acriflavine; the fourth lot was covered with tap water to serve as a control.

The eggs were immersed in the solution for twenty minutes and stirred gently with a feather. After this they were washed by decantation, packed in moss, and taken to the Sandwich State Fish Hatchery, where they were placed in four separate hatching troughs and the daily mortality recorded.

Mortality	Solution 1:1000	Solution 1:1500	Solution 1:2000	Control
1st day	40	47	35	38
2d day	104	126	129	98
3d day	38	42	45	44
4th day	17	14	29	14
5th day	15	20	30	20
6th day	15	21	30	15
7th day	15	17	26	17
8th day	20	15	28	19
9th day	14	17	18	14
10th day	12	19	14	15
11th day	10	14	15	11
	300	352	399	305

This table seems to indicate that the use of acriflavine did not adversely affect the eggs. The greatest mortality spread was on the second day between the lot treated with a 1:2000 solution and the control lot, but inasmuch as this was the weakest solution it is felt that the differential was accidental. Also, since as good results were obtained from the weakest solution, it is felt that this concentration is recommended both by the dictates of economy and those of safety. Therefore the 1:2000 solution was adopted and applied at the hatcheries in three different ways:

*Sandwich State Fish Hatchery.*—At this station the 520,000 eggs were first placed in a large tub where they were tempered and washed of adherent debris. A trough had previously been dammed off to accommodate two tiers of hatching trays.

In this method the eggs were put directly on to the trays (22 ounces of eggs per tray) which they would ultimately occupy in the hatching troughs.

The dammed off portion of the trough was then filled with a 1:2000 solution and the eggs immersed for twenty minutes. At the end of this time they were placed in the hatching troughs where the rapid stream of water would quickly dilute the acriflavine. The fluorescence in dilute solution could be detected for a number of days after.

To speed up the process, this method was later modified by placing 44 ounces of eggs on each tray and later dividing each lot into two parts for the hatching troughs. This worked satisfactorily but was very time-consuming owing to the number of times each tray had to be handled, and it was necessary to keep all temperatures uniform.

The mortality ran higher than in the following methods, due, apparently, to the increased handling.

*Palmer State Fish Hatchery.*—At this hatchery 215,000 brook trout eggs were disinfected in a much shorter time by the following method: In a large tub which had previously been filled with a tempered 1:2000 solution of acriflavine, the eggs were placed and stirred gently with a feather. After this they were washed in the tub by decantation with

clean tempered water, and immediately after this they were placed on the hatching trays. This method was quicker than the method used at Sandwich but the washing was not as rapid. The greatest dangers lie in too long exposure of the eggs in the solution and in the possibility of smothering the eggs by too close packing in the tubs during the process.

*Montague State Fish Hatchery.*—In an effort to overcome the disadvantages of the above methods, a new technique was developed at this hatchery and the 465,000 brook trout eggs at this station were treated as follows:

A hatching trough was dammed at the intake to hold the equivalent of three tiers of hatching trays.\* The 1:2000 solution was made up in this section of the trough and the eggs were placed in it loose and allowed to remain for twenty minutes. During this period they were stirred periodically with a feather.

Adjoining the section in which the eggs were to be disinfected another compartment of the same size was arranged by installing a screen and flashboard or a lower dam. This compartment was then filled with water to prevent too great a rush of water when the dividing dam was removed.

When the twenty-minute disinfection period had elapsed one-half the dividing dam was removed and at the same time the water was turned into the section containing the eggs and simultaneously the upper part of the lower dam was removed so that the eggs were quickly drained without being subjected to any mechanical shock and were still kept wet. When nearly all of the solution was drained off the water was turned on full and the trough filled with the eggs in it. This draining had to be done quickly to prevent a concentrated film of solution from surrounding each egg.

From this very dilute solution the eggs were placed on trays for hatching.

#### DISCUSSION

The method employed at the Montague State Fish Hatchery seemed to do away with the disadvantages of the methods used at the other two stations without introducing further complications and has been adopted as a practical method for use at the State hatcheries.

It is felt that this offers an inexpensive, quick, and safe method of prophylaxis against probably the greatest peril which confronts the fish culturist, and in conjunction with the prophylactic sterilization of pools this work will be carried out each year at our hatcheries.

#### ACKNOWLEDGEMENT

This Division wishes to express its appreciation to Dr. David L. Belding of the Boston University School of Medicine for his kind and valuable assistance in this work.

This method has been adopted as a practical one for use at the State's hatcheries and will be used each year in conjunction with the prophylactic sterilization of pools.





The Commonwealth of Massachusetts

ANNUAL REPORT

OF THE

Division of Fisheries and Game

FOR THE

YEAR ENDING NOVEMBER 30, 1933

1933

DEPARTMENT OF CONSERVATION

[OFFICES: 20 SOMERSET STREET, BOSTON.]



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JOHN L. SALTONSTALL, *Chairman*, representing the Massachusetts Fish and Game Association.

HAROLD M. BRADBURY, representing the Council of Sportsman's Clubs.

JUDGE ROBERT WALCOTT, representing the Massachusetts Audubon Society.

FRANCIS H. ALLEN, representing The Federation of the Bird Clubs of New England, Inc.

HENRY N. JENKS, representing the Massachusetts State Grange.

ELMER M. POOLE, representing the Massachusetts Farm Bureau Federation.

# The Commonwealth of Massachusetts

## ANNUAL REPORT

The Director of the Division of Fisheries and Game herewith presents the sixty-eighth annual report.

### GENERAL CONSIDERATIONS

The year nineteen hundred and thirty-three bids fair to become memorable as marking the beginning of a great readjustment era, the tendency of which is to place governmental and private business on a more efficient and economically sound basis. It is not unusual, therefore, that a retrospect on the affairs of this Division for the past year should show a distinct reflection of this universal movement.

A marked decrease in the inland fish and game appropriation of the Division made strict economy essential, but in the absence of this necessity the policy of placing the Division on a more businesslike and efficient basis would have nevertheless continued during these twelve months.

During the year the work was completed in the establishment of all the fish hatcheries as independent producing units, and all of the fish hatcheries were brought up to a maximum of production through the development of available lands and waters. In addition to the physical improvements a definite step was taken to establish a policy of selective breeding which is certain to improve the quality and rate of growth of the fish produced at each hatchery. Quality must in the future accompany quantity.

Many improvements were made at the game farms to place them on a more efficient basis, and the succeeding pages of this report will disclose the fact that the cost of producing game birds at the farms experiencing no unusual difficulties, was the lowest in the history of the Division.

The Division has been particularly concerned with improving natural conditions in the waters and covers of the State, and definite steps have been taken to increase the fish resources through the closing of feeder streams on some of the important trout fishing waters. The biological survey of inland streams was pushed forward to make it possible to distribute trout in a manner which will develop a natural fishery and improve the opportunities for angling. Scientific surveys have been made in some of the State Forests and a definite program has been established for the development of the wild life resources within those Forests.

The activities of the Federal government in connection with reemployment has been an important factor in the work of the past year, as members of the Civilian Conservation Corps have been engaged on many of the State Forests in building ponds for public fishing and in the creation of additional fish hatching and rearing facilities.

During the closing days of the fiscal year the Federal Civil Works Administration program resulted in the allotment of approximately \$100,700 to complete the final construction work at the game farms and fish hatcheries and for development of wild life sanctuaries.

In addition to the cooperative efforts of the Federal government in so far as its general reemployment program was concerned, the Division, through its own funds, was able to play an important part in the reemployment of men and the stabilization of private business. The construction work performed by the Division during the year provided for 3,689 days of employment of men secured from the local welfare boards, who might otherwise have been the recipients of public aid.

Corresponding with this aid to the unemployed, funds were reserved enabling the Division to make large purchases of fish and of game birds from private

hatcheries, not only providing a welcome market for surplus stock, but adding materially to the wild life resources of the State as well.

Thus, the Division has demonstrated that proper organization and efficient administration could successfully offset a decrease of \$22,914.40 in its appropriation for inland fish and game work and effect increased production and development.

In the work concerning marine fisheries a complete reorganization was effected through the consolidation of all the activities under one head. This change brought about an immediate and definite improvement, and the State Supervisor of Marine Fisheries, despite restricted funds, was able to render greater service to the sea and shore fisheries industry of the State, the value of which was recognized by the Federal Civil Works Administration in the final days of the fiscal year by a grant of approximately \$92,700, to continue, in the succeeding months, some of the outstanding activities.

An awakened public interest in the work of the Division, splendid cooperation from various groups of citizens interested in its activities, and general confidence in the wisdom of its policies, aided materially in molding the accomplishments of the year now closing.

#### PERSONNEL

Mr. Raymond J. Kenney of Belmont was reappointed, on December 15, 1932, as Director of the Division of Fisheries and Game, and took the oath of office on December 23.

The term of State Inspector of Fish Arthur L. Millett expired Nov. 21, 1931. He continued to serve from that time until Jan. 6, 1933, when his successor, William D. Desmond of Stoneham, took office.

The services of Zenas A. Howes as State Supervisor of Marine Fisheries (whose term expired Oct. 16, 1932) terminated May 26, 1933. On that date William D. Desmond, already serving in the Division as State Inspector of Fish and who had been appointed as State Supervisor of Marine Fisheries on May 24, took his place.

By vote of the Governor and Council on August 9 the action of Commissioner York was approved, designating William D. Desmond to perform the duties of the Director of the Division of Fisheries and Game in case of and during the absence of the Director.

The temporary appointment of Carl G. Bates of Natick as Chief Fish and Game Warden was made permanent as of March 20, following a civil service promotional examination.

The provisional appointment of Warden Lloyd M. Walker of Maynard as Fish and Game Warden Supervisor was made permanent as of June 1, following a promotional competitive examination among the wardens.

#### FINANCES

Reference to the accompanying tables will indicate that the revenue from the sale of licenses to hunt, trap and fish during the fiscal year shows a decrease of \$36,193.75. Further study will indicate that during the same period 121,249 licenses (excluding duplicates) were issued in comparison with 113,067 during the preceding fiscal year.

The decrease in revenue is the direct result of the new fees for sporting, hunting and fishing licenses which became effective on Jan. 1, 1933. When this scale of prices was established by the Legislature it was predicted that the great increase in the sale of licenses, particularly fishing licenses, would counteract the reduced rates which were adopted when separate licenses were provided for. But the accompanying table shows that, disregarding the low-cost licenses to women and minors, fewer fishing licenses were issued than hunting licenses, and it was inevitable that in the face of these facts, the revenue should show a substantial decrease. It should be borne in mind also that the new license scale went into effect on January 1, and that the revenue received during December, 1932 (which is part of the fiscal year), and January, 1933, was on the basis of the old license fees. Consequently, a further decrease in revenue can be anticipated in 1934, for the reason that the reduced license fees will be in effect during the entire twelve months.



At the time the present license fees were adopted the committee on conservation expressed the intention of trying them out for the period of a year and requested the Division to report the results of the present license system. Accordingly the Director has included in his legislative recommendations a bill which will bring this license situation to the attention of the committee on conservation in 1934.

During the past two years the Division was required to operate its inland fish and game activities on the basis of its revenue of the preceding fiscal year. If this policy is continued in 1934, it will result in a drastic curtailment of the activities due to a substantial drop in the revenue of 1933. The situation has become so pointed that the organized sportsmen of the State contemplate filing legislation seeking to maintain the warden force of the Division on funds which are not a part of the revenue of the Division. While this change in policy becomes very necessary at the present moment, yet it is not a drastic change but a return to the system which was in effect over many years. Following is a table showing the appropriation of the Division for inland fish and game work (not including the marine fisheries) during the past seventeen years as compared with the revenue for the corresponding part of the work received during the preceding fiscal year.

YEAR	Appropriation for Inland Fish and Game Work	Revenue of Preceding Year from Inland Fish and Game Work	Excess of Appropriation over Revenue from In- land Fish and Game Work
1917 . . . . .	\$161,222.71	\$68,455.51 (1916)	\$92,767.20
1918 . . . . .	161,600.00	55,907.54 (1917)	105,692.46
1919 . . . . .	178,900.00	59,427.46 (1918)	119,472.54
1920 . . . . .	209,967.00	74,064.64 (1919)	135,902.36
1921 . . . . .	201,790.00	108,819.91 (1920)	92,970.09
1922 . . . . .	216,850.00	115,355.41 (1921)	101,494.59
1923 . . . . .	211,250.00	181,353.93 (1922)	29,896.07
1924 . . . . .	209,901.65	191,753.09 (1923)	18,148.56
1925 . . . . .	200,180.00	190,540.95 (1924)	9,639.05
1926 . . . . .	214,753.10	174,898.10 (1925)	39,855.00
1927 . . . . .	231,030.00	232,881.95 (1926)	-
1928 . . . . .	257,653.26	248,574.30 (1927)	9,078.96
1929 . . . . .	267,400.00	249,924.53 (1928)	17,475.47
1930 . . . . .	300,450.00	279,636.42 (1929)	20,813.58
1931 . . . . .	344,300.00	284,635.70 (1930)	59,664.30
1932 . . . . .	309,000.00	308,633.94 (1931)	366.06
1933 . . . . .	286,085.60	286,085.60 (1932)	-
	\$3,962,333.32	\$3,110,948.98	\$851,384.34
Less excess of revenue over appropriation in 1927 . . . . .			1,851.95
			\$851,384.34

It will be noted that with the exception of the years 1927 and 1933, the Division has never been required to be self-supporting in respect to its inland fish and game work, and that during these years the respective legislatures appropriated \$851,384.34 in excess of revenue for the maintenance of the Division and the development of its properties. A return to a policy of appropriating money in excess of revenue will not be a radical departure in State finance. In fact, the Division would never have been able to build up its fish hatcheries and game farms, establish public fishing grounds, or carry out other useful projects during the past seventeen years if it had been restricted to the use of its revenue alone, and an examination of the accompanying table will indicate that this has not been the practice.

As outlined elsewhere in the report, plans have been completed for developing the wild life resources on State Forest lands under the control of this Department. To finance this plan, an additional part (to be known as Part IV) was added to the Division's Forecast for the year 1934, calling for the appropriation of \$54,720 for the employment of game managers on certain State Forests. This appropriation was requested separate and apart from the regular inland fish and game work of the Division, and it is not anticipated that any appropriation for this project will be charged against the present revenues of the Division.

## APPROPRIATIONS AND EXPENDITURES

	Appropriations	Balances, transfers	Expenditures	Balances to 1934	Balances to State Treasury
<b>Part I (1932 revenue \$286,085.60)</b>					
Salary of the Director . . . . .	\$4,200.00	-	\$4,200.00	-	-
Office Assistants, Personal Services . . . . .	14,160.00	-	13,917.00	-	\$243.00
Office Expenses . . . . .	11,200.00	\$397.21	11,290.36	-	306.85
Education and Publicity . . . . .	1,000.00	-	929.91	-	70.09
Enforcement of Laws:					
Personal Services . . . . .	69,480.00	-	68,478.89	-	1,001.11
Expenses . . . . .	32,925.00	266.64	29,623.26	\$549.15	3,019.23
Biological Work:					
Personal Services . . . . .	9,180.00	-	9,177.60	-	2.40
Expenses . . . . .	2,400.00	.80	2,343.25	42.00	15.55
Propagation of Game Birds, etc. . . . .	123,680.60	189.98	122,937.80	-	932.78
Special: for Improvements and Additions at Fish Hatcheries and Game Farms . . . . .	9,700.00	6,729.52	13,099.98	3,329.54	-
Establishment and Maintenance of Public Fishing and Hunting Grounds . . . . .	-	11,823.49	10,484.27	-	1,339.22*
Supervision of Public Fishing and Hunting Grounds:					
Personal Services . . . . .	1,105.00	-	1,090.83	-	14.17
Expenses . . . . .	1,500.00	-	1,059.02	410.00	30.98
Damages by Wild Deer and Wild Moose . . . . .	5,700.00	-	4,639.37	-	1,060.63
<b>Part II (1932 revenue nothing)</b>					
Protection of Wild Life . . . . .	1,540.00	-	1,525.10	-	14.90
<b>Part III (1932 revenue \$9,083.50)</b>					
State Supervisor of Marine Fisheries:					
Personal Services . . . . .	8,520.00	-	8,194.13	-	325.87
Expenses . . . . .	4,875.00	79.85	4,329.39	457.09	168.37
Sale and Cold Storage of Fresh Food Fish:					
Personal Services . . . . .	12,780.00	-	11,510.55	-	1,269.45
Expenses . . . . .	3,275.00	2.40	3,109.14	-	168.26
Purchase of Lobsters . . . . .	9,500.00	-	4,078.96	-	5,421.04
Enforcement of Shellfish and other Marine Fishery Laws:					
Personal Services . . . . .	18,410.00	-	18,378.00	-	32.00
Expenses . . . . .	9,875.00	76.83	9,765.76	15.00	171.07
Extermination of Starfish, etc. . . . .	15,000.00	6,288.80	13,809.85	7,478.95	-
	<b>\$370,005.60</b>	<b>\$25,855.52</b>	<b>\$367,972.42</b>	<b>\$12,281.73</b>	<b>\$15,606.97</b>

\* Not used because it expired June 10, 1933.

## REVENUE

Following is the revenue accruing to the State Treasury for the period of the fiscal year, from the activities of this Division.

	<b>Part I</b> Produced by the hunters, anglers and trappers	<b>Part II</b> Produced by those who en- joy wild life but do not hunt, fish or trap	<b>Part III</b> Produced by the marine fisheries
<b>PART I</b>			
Hunting, fishing, sporting and trapping license fees (\$240,272.90 less \$273.15 refunded on account of overpayments in 1932)	\$239,999.75		
Rent, sales, etc., at stations	697.00		
Sale of game tags	43.15		
Sale of confiscated goods	11.05		
Sale of shiner permits	315.00		
Gunning stand registrations	976.25		
Miscellaneous sales, or other unclassified items: sales, \$44.25; auto damage claim, \$13.09; telephone claim, \$169.47; railroad claim, \$3.13; sale of land in Marsh- field, \$25; refunds prior years, \$2.92; interest on bank account, \$12.90; total, \$270.76, less railroad claim, \$3.13 erroneously turned in as revenue but later credited to appropriation	267.63		
Fines turned into State Treasury as a result of viola- tions of inland fish and game laws	6,929.00		
<b>PART II</b>			
Nothing		Nothing	
<b>PART III</b>			
Crab and lobster license fees			\$5,170.10
Sale of lobster meat permits			960.00
Sale of lobster rules			7.50
Lease of clam flats			65.00
Sale of confiscated goods			7.65
Fines turned into State Treasury as a result of viola- tions of marine fisheries laws			3,130.30
Total revenue, \$258,579.38	\$249,238.83	Nothing	\$9,340.55



## DETAIL OF RECEIPTS FROM LICENSES TO HUNT, FISH OR TRAP (for fiscal year Dec. 1, 1932 to Nov. 30, 1933)

On Jan. 1, 1933, a new schedule of licenses went into effect. Thus within the fiscal year revenue was received for licenses on two different price scales.	Total number issued	Gross value	Fees to clerks	Net Return to State
<i>Receipts under Old Scale of Prices</i>				
Resident Citizen Sporting (\$2.75)	5,606	\$15,416.50	\$1,399.00	\$14,019.00*
Non-resident Citizen Sporting (\$10.25 and up)	113	1,909.45	27.50	1,881.95
Non-resident Citizen Sporting (\$3.25 and up)	36	267.70	9.00	258.70
Non-resident Citizen Trapping (\$5.25 and up)	1	10.50	.25	10.25
Alien Sporting (\$15.25)	14	213.50	3.50	210.00
Minor Trapping (\$1.25)	152	190.00	38.00	152.00
<i>Receipts under New Scale of Prices</i>				
Resident Citizen Fishing (\$2.00)	37,976	75,952.00	9,362.00	66,590.00
Resident Citizen Hunting (\$2.00)	38,238	76,476.00	9,483.25	66,992.75
Resident Citizen Sporting (\$3.25)	24,562	79,826.50	6,086.25	73,740.25
Resident Citizen Minor and Female Fishing (\$1.25)	7,706	9,632.50	1,910.75	7,721.75
Resident Citizen Trapping (\$5.25)	406	2,131.50	101.25	2,030.25
Resident Citizen Minor Trapping (\$2.25)	113	254.25	28.25	226.00
Resident Citizen Sporting (Free)	5,397	-	-	-
Non-resident Citizen Fishing (\$5.25)	635	3,333.75	157.50	3,176.25
Non-resident Citizen Hunting (\$10.25)	228	2,337.00	56.75	2,280.25
Non-resident Citizen Sporting (\$15.25)	27	411.75	6.75	405.00
Non-resident Citizen Minor Fishing (\$2.25)	32	72.00	8.00	64.00
Non-resident Citizen Trapping (\$15.25)	1	15.25	.25	15.00
Duplicate Licenses (50c)	978	489.00	-	489.00
Special Non-resident Citizen Fox Hunting (\$2.00)	6	12.00	1.50	10.50
Totals, sporting, hunting, fishing and trapping licenses, including duplicates	122,227	\$268,951.15	\$28,679.75	\$240,272.90*
Deduct refunds made on account of 1932 licenses	-	-	-	273.15
				\$239,999.75
Resident Citizen Lobster (\$5.00)	988	4,940.00	148.20	4,791.80
Non-resident Citizen Lobster (\$5.00)	13	65.00	1.95	63.05
Resident Citizen Crab (\$5.00)	65	325.00	9.75	315.25
Totals, marine licenses	1,066	\$5,330.00	\$159.90	\$5,170.10

\* Includes \$1.50 payment on a license account of 1931, town of Mashpee.

## CONVENTIONS AND MEETINGS

No authorizations were requested for travel outside the State.

The unofficial Advisory Council created by the Director in 1931 having proved a harmonious and constructive means of bringing together the several classes interested in the preservation of the wild life resources of the Commonwealth and their proper use, His Excellency Governor Joseph B. Ely reorganized it as a smaller and more closely knit group to be known as the Advisory Board to the Division of Fisheries and Game. The new board consists of representatives of six organizations, representing those having major interests in conservation matters,—the sportsmen, the so-called bird lovers, and the farmers and land owners. The first meeting was held February 9 at the office of the Division. The six organizations were represented as follows:

Massachusetts Fish and Game Association: Mr. John L. Saltonstall.

Council of Sportsman's Clubs: Mr. Alfred H. Brown.

Massachusetts Audubon Society: Judge Robert Walcott.

The Federation of the Bird Clubs of New England: Mr. Francis H. Allen.

Massachusetts State Grange: Mr. Henry N. Jenks.

Massachusetts Farm Bureau Federation: Mr. Elmer M. Poole.

After the new board had organized with Mr. John L. Saltonstall as chairman, bills then before the legislature, and other matters pertaining to the work of the Division, were discussed.

The second meeting was held October 11, with the same representation as the first, except that Mr. Harold M. Bradbury succeeded Mr. Alfred H. Brown as representative of the Council of Sportsman's Clubs.

Consideration was given to the question of what matters should be brought before the next legislature, and new lines of endeavor were discussed. Outstanding among these was the proposition by Judge Walcott to seek legislation requiring an examination for persons who desire licenses to hunt. The chairman was instructed to appoint a committee of three to study the matter and report back a proposal for legislation, to the next meeting of the board. Mr. Raymond L. Clapp representing the Massachusetts Farm Bureau Federation, Mr. Charles B. Floyd representing The Federation of the Bird Clubs of New England, Inc., together with the chairman, Mr. John L. Saltonstall representing the Massachusetts Fish and Game Association, made up the committee.

The Director on February 11 attended the fourth meeting (its annual meeting) of the New England Fish and Game Commissioners' Association, in Boston. Maine, Vermont, Massachusetts, Rhode Island and Connecticut were represented.

After the election of officers for the ensuing year, at which George L. Stobie of Maine was elected president and Raymond J. Kenney of Massachusetts re-elected secretary, the business of the meeting was confined to a discussion of mutual problems in the fish and game work of the New England States.

The Director also attended the New England Game Conference, held on February 11 in Boston. He presented a paper entitled, "The Business Angle of Fish and Game Restoration."

#### ACTIVITIES OF STATE AND LOCAL ORGANIZATIONS

Despite the effect of the economic depression, which was apparent in practically every community, the local fish and game associations carried on their work in a generally commendable manner. The loss of membership and the inability to secure funds was apparently offset by the interest and enthusiasm of those who were in a position to continue their activities; and having gone through this period satisfactorily, greater results may be expected when the economic conditions improve.

The following table shows the number, location and membership of the various clubs:

COUNTY	Number of Clubs	Total Club Membership	Number of Clubs in the Respective County Leagues
Barnstable . . . . .	1	784	No league
Berkshire . . . . .	23	3,523	12
Bristol . . . . .	13	1,808	7
Dukes . . . . .	1	102	No league
Essex . . . . .	17	2,267	14
Franklin . . . . .	14	1,732	13
Hampden . . . . .	26	4,558	14
Hampshire . . . . .	16	1,440	10
Middlesex . . . . .	25	2,942	16
Nantucket . . . . .	1	91	No league
Norfolk . . . . .	18	1,415	15
Plymouth . . . . .	13	1,760	10
Suffolk . . . . .	2	105	2
Worcester . . . . .	45	5,727	26
	215	28,254	139

It is still to be regretted that the clubs attract but a small portion of the sportsmen of the State. The records indicate that 121,249 licenses were issued during the fiscal year, while the table of membership of all the clubs, according to the records on file in the Division, show a membership of 28,254, indicating that nearly 100,000 sportsmen do not lend their aid to the cooperative efforts of those who support their local clubs. This fact reflects further credit on the work which the clubs, in the face of limited numbers and funds, are trying to do.

It is hoped that eventually the ratio will be reversed and that the local clubs may claim at least 100,000 sportsmen among their collective membership. The field of club usefulness is broad enough to warrant that support from the sportsmen of the State.



## EDUCATION AND PUBLICITY

The system of press releases to the newspapers of the State on matters of timely interest was continued and extended by sending out an average of two releases each month in place of a single one.

The subjects covered this year were:

Starfish a menace to the shellfisheries.

Inspection of food fish, including importations, notably swordfish, from Japan, and food fish from Nova Scotia and Canada; lobster importations; filleting establishments; and retail stores.

Game and fur taken by licensed hunters and trappers during 1931.

Stocking the covers with white hares and cotton-tail rabbits.

Prosecutions during the year past, for fish and game law violations.

Stocking the streams with trout.

The public fishing grounds of the State.

Additional public fishing grounds established in the State Forests.

Salvage and re-distribution of pond fish.

Revival of the shad fishing industry in Massachusetts.

Game survey in the Harold Parker State Forest.

Construction of a new system of ponds for fish propagation, by the Civilian

Conservation Corps, in the Harold Parker State Forest.

Increase in sport fishing along the ocean front.

Announcement of the season and regulations on water fowl.

Appointment and transfer of fish and game wardens.

Liberation of quail and pheasants, both State reared and purchased.

Open season on pheasants, and regulations on all upland game.

Closing the State Forests to hunting to protect the members of the Civilian Conservation Corps.

Changes in the marine fisheries laws by the legislature of 1933.

Plans for making the larger of the State Forests experimental areas for wild life management.

Fall stocking of streams and ponds.

Interpretation of the trapping laws.

## ACKNOWLEDGMENTS

Gifts, and balances of previous ones, are reported herewith.

A gift of \$250 for purchase of land adjoining the Boxford Sanctuary was received from Dr. John C. Phillips of Wenham, and the land purchased.

A gift of \$25 was received from The Federation of the Bird Clubs of New England, Inc., to be used for road repair in the Boxford Sanctuary. A similar sum was received last year, but not spent. These two amounts, together with three dollars left from the land purchase and \$2.05 interest on the Trust Fund, were used to put the Boxford Sanctuary roads in good condition.

The League of Worcester County Rod and Gun Clubs, Inc., donated (by payment direct to the seller) \$100 toward the purchase price of land at the Montague State Fish Hatchery.

## ENFORCEMENT OF THE GAME AND INLAND FISH LAWS

The law-enforcement set-up has undergone a more decided change this year than in any similar period in a number of years. Several districts in the eastern part of the State have been changed, by reassignment of towns, to make a better set-up for law-enforcement work. In this manner the Andover district was absorbed by other districts, and a new Boston district created. In making up the latter, the towns in which any real hunting and fishing activities are carried on were placed in adjoining districts, so that the new Boston district is almost entirely a market proposition, and the warden in charge spends the greater part of his time in overseeing the importation, storage and sale of game as permitted by law.

Numerous transfers were made and five permanent men appointed to fill vacancies caused by the retirement of some of the older men. The following



wardens were transferred to new districts for the good of the service, and to better balance up the law-enforcement requirements of the Division:

Warden Warren W. Leary, from Great Barrington to Lynn district.  
Warden John E. Buckley, from Lee to Great Barrington district.  
Warden John J. Broderick, from Northampton to Ayer district.  
Warden Walter W. Gilmore, from Lynn to Northampton district.  
Warden Oscar L. Cregan, from Uxbridge to Worcester district.  
Warden James A. Peck, from Fitchburg to Northbridge district.  
Warden Herbert C. Peaslee, from Andover to Fitchburg district.  
Warden Henry M. Parlee, from Ayer to the new Boston district.  
Warden Ernest P. Anyon, from Falmouth to Nantucket district.  
Warden William H. Waterhouse, from Nantucket to Upper Cape district.

Upon reaching the age of seventy, when retirement becomes compulsory, Wardens Nathan W. Pratt of Middleborough and Everett B. Mecarta of Harwich were retired from the service, effective February 18 and October 5, respectively. Warden Jay N. Snell of Holden was retired from the service on July 15 on account of disability incurred in line of duty. The vacancies were filled by the following appointments:

Mr. Pierre Chouteau, Jr., of Cambridge, to the Plymouth district.  
Mr. Forest A. Rogers of Lowell, to the Westfield district.  
Mr. Robert F. Clifford of Somerville, to the Easton district.  
Mr. Chester K. Masse of Woburn, to the Lee district.  
Mr. Cyril W. Hanley, to the Lower Cape district.

The retirements over the period covered in this report are noteworthy, for they indicate the nearness of the time when the old guard, as it may well be called, will have passed from active service. Too much cannot be said of the constructive work done by the older wardens now rapidly retiring from the ranks, when it is considered that a game warden a few years ago merited little, in the eyes of the public, and carried on his work under conditions now foreign in the law-enforcement branch of the service.

The district court work for the year was as follows: number of cases prosecuted, 1,066; district court convictions, 945 (of which 252 were filed and 31 appealed to the Superior Court); discharged, 121; fines imposed in district courts, \$9,830. Persons convicted for a violation of the fish and game laws are required by law to surrender any licenses they may hold, and are further denied the privilege of obtaining another for a period of one year from the date of conviction. Conditions continue to be such that many cases are placed on file on account of the inability of the defendants to raise money to pay the fines. This year, for the first time, a gunning stand registration was revoked for the period of one year, for violation of the fish and game laws at the stand.

While fines imposed in some cases were not as heavy as in similar cases last year, the violations nevertheless were in many cases as important, with fines ranging from ten to one hundred dollars in cases of taking song and insectivorous birds, or birds otherwise protected by law.

The system started last year for disposing of deer accidentally or illegally killed, was continued, namely, personal distribution by the wardens to needy families named by the local welfare boards. There were 305 families thus furnished with meat, in amounts varying with the size of the family.

The deputy warden service, under the plan outlined in the last report, operates with greater efficiency than under the old conditions. This is shown by the larger number of cases prosecuted by the reduced deputy warden force, as contrasted with the results obtained previous to the adoption of the present policy.

#### NEW LEGISLATION OF 1933

Following are listed the laws relating to fish and game, enacted during the legislative session of 1933. While the number of new laws added is not great, nevertheless in their effects they are fairly far-reaching.

Chapter 122 provides for the taking or killing of waterfowl and other migratory birds, under permits from the Director, where evidence is presented to

show that they have become a serious menace to marine fisheries or a nuisance with respect to property along or near the shores of the Commonwealth.

Chapter 154 gives protection to certain birds not previously protected by law, namely, red-tailed, red-shouldered, duck and pigeon hawks, and barred owls.

Chapter 180 provides for a right of way to be laid out to Lake Marguerite (also known as Simon Pond) in the town of Sandisfield.

Chapter 192 closes the season on deer in Barnstable county; and also makes provision whereby deer about to damage crops may be taken during close season by an owner or occupant of land with the aid of artificial lights under limited permit issued by the Director.

Chapter 203 amends the so-called anti-steel trap law so that restrictions under which trapping may be carried on are considerably modified. But the filing of a petition for a referendum suspended the operation of the act until the people of the State have made their wishes known at the State election of 1934.

Chapter 214 establishes special licenses so that a non-resident member or non-resident invited guest of a club or association conducting fox hunts within the Commonwealth may procure a special fox hunting license at a cost of two dollars, for periods not exceeding in the aggregate six days within any calendar year and during regular fox hunts conducted to hunt foxes only.

Chapter 329 strikes out Chapter 130 of the General Laws as amended and substitutes a new Chapter 130, which is a codification of the laws relating to marine fish and fisheries, including crustacea and shellfish. It also inserted into the General Laws a new chapter, to be known as Chapter 129-A. This new chapter further clarifies and amplifies definitions and rules of construction; makes them apply also in Chapter 130 (the marine laws) and in Chapter 131 (the inland fish and game laws); and brings certain laws within the jurisdiction of both the inland and marine parts of the work.

#### RECOMMENDATIONS FOR FUTURE LEGISLATION

It is recommended that legislation be enacted to accomplish the following purposes, and drafts of bills have been filed as required by law, for consideration of the General Court in 1934.

*To increase the Fees for Hunting, Fishing and Trapping Licenses.*—In 1932, a law was passed providing for the issuance of separate hunting, fishing and trapping licenses. While the necessity for providing for separate licenses was generally recognized, there was much difference of opinion as to the proper fees which should be charged for each class of license, in order that the revenue of the Division should not suffer as a result of fees which were too low. The Committee finally decided on the present fees, with the understanding that the fees should be readjusted if the revenue of the Division showed a deficit after the law had been in operation for one year. The present license fees have been in effect since January 1, 1933, and as a result thereof, the revenue of the Division has dropped by several thousand dollars, the exact amount of which cannot be determined until the books are closed for the fiscal year. For that reason, it is impossible to recommend at this time the fees which would be necessary to maintain the revenue of the fiscal year of 1932, but these fees can be determined before legislative consideration is given to this recommendation.

*To prevent Damage or Stealing of Property while Hunting, Trapping or Fishing.*—Many complaints are received of the wilful or negligent injury to property on the part of persons hunting or fishing. It is the desire of the Division to protect land owners against the depredations of persons who do not respect the privilege which they have of hunting and fishing on private property. To accomplish this, the wardens should be empowered to arrest and prosecute any person whom they find destroying, stealing or injuring property. The wardens spend the greater portion of their time in the back country regions, and it is believed that they can be used as a valuable police force in the remote rural districts.

*To regulate Fishing on Public Fishing Waters.*—The present law allows the Director to make rules and regulations concerning fishing on waters leased as public fishing waters, but it does not allow the Director to remove the statutory restrictions which are placed on certain species of fish found to be detrimental



to such waters. It would be desirable to allow the Director to remove the statutory restrictions on certain species of fish which are detrimental to the maintenance of trout in the public fishing waters.

*To change the Title of Salaried Fish and Game Wardens to that of Conservation Officers.*—The work of the present salaried wardens has extended to all phases of conservation work and is not confined to that type of work which the public associates with fish and game wardens. Following the precedent set by the Federal government and many of the progressive states, it appears to be desirable to change the title of these officers to properly describe their duties.

### BIOLOGICAL WORK

Many specimens of fish, birds and quadrupeds were received for pathological examination, and autopsies were made by Dr. David L. Belding of the Boston University School of Medicine and by Dr. E. E. Tyzzer, Dr. Hans Theiler, and Dr. Elizabeth Jones of the Harvard Medical School. To all of these thanks for their assistance are extended.

Early in the summer Mr. Arthur Merrill, Fish Culturist in charge of the Sutton State Fish Hatchery, was assigned to duty with the biologist and has been in the field in an advisory capacity in connection with the construction of ponds in the State Forests and exploring for prospective pond sites for future development. This addition to the personnel will make it possible to undertake several special problems.

With the creation of the Civilian Conservation Corps by the Federal government, the Division is engaged with the construction of ponds on the State Forests which will be developed in a number of instances as trout ponds for the sportsmen, although their primary purpose will be for water storage for fire control. The biologist is in the process of stocking these ponds as they are completed, and is advising, from time to time, in connection with the construction of dams, installation of screens, and the construction of fishways.

The stream survey begun last year was continued during the spring, summer and fall months on the Deerfield, Millers, Farmington, Copecut and Shingle Island Rivers. Information obtained and tabulated concerning these streams is on file, and a stocking policy has been adopted for them which was used in allotting stock in the distribution program this year. Data was also obtained for determining which feeder streams should be closed.

A study was made of pollution in the Deerfield River with the cooperation of Dr. Willard C. Green of Boston, who generously contributed his services. A detailed investigation of this case was made and a method of procedure evolved which will be applied to other streams when the Division can proceed on a survey of stream pollution. Stream pollution is one of the most serious menaces to fishing in this State, and the Division is, and will continue to be, greatly impeded in its effort to make the streams habitable for fish life until public opinion is aroused and until adequate and enforceable laws prevail.

Several requests were received for permission to use copper sulphate for the extermination of algal growths in ponds. One test is in progress under the supervision of the Division which, when completed, should be of benefit in handling similar problems.

During the winter and early spring the biologist cooperated with the Emergency Waterfowl Committee of the Massachusetts Fish and Game Association in an investigation of conditions affecting brant, particularly in connection with the disappearance of eel grass from the Massachusetts shore line.

Prophylactic sterilization of the rearing pools at the Sandwich, East Sandwich and Sutton State Fish Hatcheries was conducted with the special apparatus devised for the use of chlorine gas applied under pressure. Since the introduction of this method of treating the hatchery pools there has been no recurrence of furunculosis.

The advantage of rearing brook trout fingerlings from selected breeders has been very carefully considered, and even though definite results cannot be expected before the passage of several years, the Division is influenced to make a beginning because of the amazing results obtained by breeders of domestic animals and plants.



From the fingerlings carried over from last year for brood stock at the various stations the biologist, assisted by the culturist in charge of the respective stations, carefully selected specimens for size and color before any eggs were stripped. The scope of such a problem as "selective breeding" requires a sufficient staff at a hatchery to enable the fish culturist to devote considerable time to such experimental work.

The disinfection of fish ova against furunculosis was again carried on at all stations. Eggs stripped at the Division's own hatcheries, those transferred from one State hatchery to another, and those received from outside sources, were treated.

Fish feeding experiments were conducted at two of the fish hatcheries, but here again the scope of such a major problem requires a trained personnel which could devote its entire time to it, and in addition, rearing pools so arranged that the experiment in each could be controlled.

During July, blackhead appeared among the young quail at the Sandwich State Game Farm. It took on epidemic form and required drastic control measures. Dr. Elizabeth Jones of Harvard Medical School visited the game farm to advise with the biologist and the game culturist on the problem, and acknowledgment is made of the Division's indebtedness to her, as well as to Dr. E. E. Tyzzer who conducted pathological and bacteriological examinations on specimens.

Considerable time was given by the biologist in the selection of pheasants purchased from commercial breeders for liberation in open covers. Before any birds were taken, consideration was given to the type which was decided upon as a standard and followed in the selection by color, general appearance, and posture.

Field work also included periodic visits to the State fish hatcheries, game farms, pond units, rearing pools and natural great ponds.

The biologist and his assistant visited several hatcheries in neighboring states to study what others are doing in fish culture. A conference was also held in Albany with New York state officials in connection with stream survey.

A number of talks were given before sportsmen's gatherings. At the New England Game Conference held in Boston on February 11, the Junior Fish and Game Biologist presented a paper entitled, "The Biological Angle of Fish and Game Restoration."

## **SUPERVISOR OF FISH AND GAME PERMITS AND CLAIMS**

In addition to the lines of work reported on below, the Supervisor's work includes oversight of the Penikese Island Sanctuary and the reservations and wild life sanctuaries under the control of the Division. Reports of those activities will be found in the section on Wild Birds and Animals.

### **DAMAGE BY WILD DEER**

About the usual number of claims have been received for damage by deer to crops and orchards, but in most instances they were for smaller amounts than in past years. The outstanding large claim was (as in the two previous years) from Williamstown, where there is a winter deer run through an orchard of 4,500 trees.

A peculiar situation exists on the island of Nantucket. A number of years ago a lone buck deer found by fishermen swimming in the Sound was captured and liberated. A summer resident purchased and liberated two does. The deer began to increase, and the spectacle of the deer feeding at night proved an attraction for summer visitors. At first little damage was done, but now, with a deer population of over one hundred, more damage is being done to garden products, cranberry swamps and ornamental foliage than on any similar area in the State.

During the fiscal year there were 100 claims paid for deer damage throughout the State, amounting to \$4,156.74. In addition, \$395.65 for appraisal fees and \$86.98 for tags and other supplies, were expended.

There were 51 deer shot, as permitted by law, by land owners who found the deer either damaging or about to damage, their crops.

## EXHIBITS AND LECTURES

The regular exhibits were made at the New England Sportsmen's and Boat Show in Boston and at the Eastern States Exposition in Springfield. In addition, an exhibit was made for the first time in years at the Brockton Fair, in the New State Building.

A smaller number than usual of illustrated lantern talks were given before social organizations, numbering not more than eighteen, through the winter months.

## PERMITS

There are many classes of free permits issued, and an increasing number of special permits to cover technical points in order to properly administer this part of the work. A new law provides for permits to authorize the taking or killing, subject to Federal regulation, of any species of migratory bird in places where such become a menace to buildings, boats and to the valuable shellfish industry. This would include gulls and terns, concerning which there has been much cause for complaint. These permits are granted only after investigation as to the necessity, and cover only the special need, whether it be to stop the eating of shellfish or to prevent injury to private or public property.

Requests for permission to breed creatures of a wild nature, such as pheasants, ducks, geese and the fur bearers, continue to be received. Several new fish culture permits have been granted the owners of private waters who desire to increase the supply and control the output.

## WILD BIRDS AND ANIMALS, AND FRESH WATER FISH

## GAME

*Game Survey.*—A game survey program, paralleling the stream survey which has been under way for the past two years, was put into operation this year. For some time the Division has not been satisfied with the results obtained from stocking the covers of the State with game birds and animals, and it is evident that, as in the case of the trout brooks, a study must be made of the areas into which the game has been and will be planted, to determine its ultimate fate. Mr. Herbert K. Prout of Quincy, a graduate of the Game Conservation Institute of New Jersey, was employed to make the survey.

His first location was in the Harold Parker State Forest at Andover, where a thorough survey was made and a report submitted, indicating a marked scarcity of useful birds and animals, despite the fact that the area had been closed to public shooting for nearly twenty years. A large number of predatory birds and animals was found within the area, which undoubtedly accounted for the scarcity of game; but it may also have been that the natural conditions within the Forest needed to be improved in the way of providing nesting and feeding grounds and protective covering to build up a supply of wild life.

A similar survey was made in the Boxford Sanctuary, with like results. In order to complete the picture for that part of the State, a survey was also made of the territory lying between the State Forest and the Boxford Sanctuary, the greater part of which was open to public shooting. While the game conditions in this area were found to be much better than in the protected areas, it must be said, in fairness all round, that this area consisted of agricultural or semi-agricultural lands, whereas the sanctuary and the forest comprise largely wild land.

Later in the year a survey was made in the October Mountain State Forest in Berkshire County, and again the report did not differ from that for the eastern survey, other than would be expected because of the difference in the location of the areas.

As a result of these surveys, a definite program has been laid out for their continuance on all of the State Forest lands, together with the employment of trained experts to proceed with the development of the wild life resources within the State Forests, to which, because of the continuous increase in the amount of posted land within the State, the public are largely turning for an opportunity to hunt.

The plan will result in the setting aside of definite areas in the State Forests which will be maintained and developed as sanctuaries, and these will be selected



in locations which will not interfere with the silvicultural work now proceeding in these forests. Within these areas an intensive effort will be made to develop a natural food supply and for the improvement of nesting and breeding areas. The success of this plan will depend, naturally, upon the securing of the funds referred to in the financial section of this report.

*Statistics of Game and Fur-bearing Animals taken.*—There were 73,826 reports of the game and fur taken during the calendar year 1932 filed by purchasers of 1933 sporting, hunting, fishing and trapping licenses. These reports show that of the license holders of 1932, 24,158 took no game or fur (presumably fishermen); 30,702 took game; and 3,534 took fur. 15,432 persons who bought licenses in 1933 held none in 1932. Tabulated, the reports show the amount of game and fur taken to have been—

Gallinules . . . . .	259
Rails . . . . .	790
Wilson snipe (Jack snipe) . . . . .	2,537
Fresh-water coots (mud hens) . . . . .	2,105
Ducks (including skunk head, butter bill and white winged scoters, commonly known as "coots") . . . . .	69,236
Geese . . . . .	5,466
Brant . . . . .	1,720
Woodcock . . . . .	19,472
Quail . . . . .	16,047
Ruffed grouse . . . . .	34,626
Pheasants . . . . .	37,931
Deer (bucks, 459; does, 438) . . . . .	997
Cotton-tail rabbits . . . . .	149,032
White hares . . . . .	17,788
Gray squirrels . . . . .	49,820
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Total head of game taken . . . . .	407,826
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Muskrat . . . . .	24,294
Mink . . . . .	573
Skunk . . . . .	4,191
Red fox . . . . .	4,087
Gray fox . . . . .	460
Raccoon . . . . .	2,804
Weasel . . . . .	676
Otter . . . . .	39
Canada Lynx (loup cervier; <i>Lynx canadensis canadensis</i> ) . . . . .	44
Bob cat (wild cat or bay lynx; <i>lynx rufus rufus</i> ; not to include wild hunting house cats) . . . . .	116
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Total pelts taken . . . . .	37,284

*Water Fowl.*—The regulations relative to the hunting of migratory game birds differed from those of last year in certain respects, since the law is mandatory in requiring that the State regulations conform to those of the Federal government.

These differences were: daily bag limit on ducks reduced from 15 in the aggregate to 12 in the aggregate of all kinds, of which number not more than 5 might be eider ducks and not more than 8 of each or in the aggregate might be canvasbacks, red heads, greater or lesser scaups, ringnecks, blue winged teal, green winged teal, cinnamon teal, gadwalls or shovellers. There was no open season on ruddy and bufflehead ducks.

The season on geese remained the same as for last year, with the daily bag being 4 in the aggregate of all kinds. For the first time in a number of years, gunners were allowed to take the cackling goose, but a close season was declared on brant.

For all wild fowl, not more than two days' bag might be in possession at any



one time, in which the numbers might not exceed the aggregate of a two-day bag of any one species as above outlined.

The daily bag limit on woodcock was 4, and not more than 12 could be had in possession at any one time.

Reports from the registered gunning stands show the number of stands so registered to have been 357; number of reports received, 347; ducks shot, 18,765; geese shot, 5,669; live duck decoys used, 5,445; wooden duck decoys used, 6,156; live goose decoys used, 6,419; wooden goose decoys used, 5,771.

*Pheasants.*—On the basis of what appeared to be the desire of the majority of the sportsmen of the State, an open season for hunting pheasants was declared by the Director, which differed in no way from that of the year before. No change was made in respect to the shooting of hen pheasants.

*Deer.*—The total of deer reported killed in open season was (for the one-week open season of December, 1932, falling within the period of this report) 997 (559 bucks and 438 does), divided among the counties as follows: Barnstable, 70; Berkshire, 236; Bristol, 43; Dukes, 2; Essex, 8; Franklin, 164; Hampden, 147; Hampshire, 73; Middlesex, 19; Nantucket, closed; Norfolk, 9; Plymouth, 71; Suffolk, none; Worcester, 104; locality not stated, 51. The small total is more probably due to incomplete returns than to smaller kill, because the law did not require the report to be made until the next license was purchased. In some cases this would be as much as a year later.

Data on damage to orchards and crops by wild deer has been treated in the section covering work of the Supervisor of Fish and Game Permits and Claims.

*Wild Cat Bounties.*—Bounties were paid on 125 wild cats, totaling \$1,250.

#### RESERVATIONS

##### *Penikese Island Sanctuary, Henry S. Turner, Caretaker*

No construction was done, and only the most necessary repairs, for the amount appropriated for the operation of this sanctuary was greatly reduced. The grass was kept cut in the cemetery, and by filling and sodding graves the appearance of the place was improved.

The terns and the herring gulls nested in large numbers and the young were reared very successfully, about the only young lost being those killed in the severe storm of July 4 and 5. Food being very scarce for the herring gulls last winter, they started catching rabbits, though not very extensively.

The rabbits wintered well. As winter feed, different kinds of vegetables such as beets, carrots, parsnips, cabbage and turnips were tried, but they would leave any of these for common feed corn. A garden to grow vegetables for the rabbits was planted in the spring, but on account of the dry weather the production was small. After the fall rains started, the clover and other natural rabbit food came up well. It was a good breeding year, and 382 rabbits were trapped and distributed on the mainland.

The ponds were kept open as usual to furnish fresh water at all times for the wild birds; but as a measure of economy the ducks and geese, which have been kept in the fresh-water ponds over a series of years to serve as decoys, were liberated. Some of these have disappeared, while others are still seen at points about the island.

A small number of black ducks were captured and banded by the caretaker for the U. S. Bureau of Biological Survey.

Several prominent ornithologists visit the island each year. This year, Dr. C. H. Townsend of Ipswich discovered a pair of Leach's petrel nesting in the stone wall, the first known instance of their nesting in Massachusetts. The Penikese Island Sanctuary is the one most exposed to the elements and the most difficult to reach, but it is famed as a place to see and study many forms of wild life about its shores, and several marine forms are found near the island which are not obtainable at any other point in Massachusetts. Other visitors were members of The Federation of the Bird Clubs of New England, Inc., students and instructors from the biological school at Woods Hole, and college students from various parts of the country. Several parties of bird banders visited the island and banded over 200 herring gulls.

The power boat "Cora" was prepared for service and on July 19 was assigned for use in the marine fisheries work. Transportation is now obtained by the hire

of a fishing boat, and contact with the mainland is given during the winter months by the Cuttyhunk mail boat once each week.

The island was re-posted with "No Trespass" signs, and a constant patrol maintained to restrict the landing of persons having no legitimate business on the island.

### *Other Sanctuaries*

Certain of the sanctuaries are of little practical value, and there are few improvements which could be made for the betterment of the wild life which uses them at certain seasons. Some of these areas are small, gravelly islands, low-lying, often swept by winter storms and used but little except as resting places for gulls and terns. Some of the inland reservations would be more effective if a resident caretaker could be provided to make the areas more attractive to the wild life by proper handling of the grounds, keeping the detrimental factors in check and building up the useful. In several instances adjoining land, available at a small price, would be advantageous to the wild life in the reservation, since much of the so-called vermin breeds in those areas and is not under control. If funds were available, bird feeding shrubs could be planted,—mulberries, mountain ash, viburnum, and many others. A number of these areas are without adequate water supply for forest fire purposes, but on most of them it would be possible, by constructing small dams, to form a series of ponds.

In the smaller reservations little was done except to visit them and replace signs that had become weatherworn. Many of the old signs tacked to trees were replaced with painted wooden signs with printed tag cloth face, into which new signs can be easily inserted.

The principal improvements made on the reservations this year have been done by labor provided by the local welfare boards.

**MINNS WILD LIFE SANCTUARY, PRINCETON**—Patrol paths were cut completely around the boundaries, and one path cut over the hilltop making it easier of access for patrol or for pulling in fire hose. The wild life in this area has suffered in the past for lack of water in the summer, for there are only three small spring holes in the whole area. For this reason the water pools on the north side were enlarged, and a new dam made to impound the water from a small spring.

**BOXFORD SANCTUARY.**—The sanctuary has received this year a finer impetus toward better conditions for wild life than has been the case at any time since its acquisition. With the assistance of the town of Boxford, the Bald Hill Road, a town right-of-way which passes through the whole area, has been gravelled in the bad spots and evened until it is now more passable than for many years. Turn-outs have been made, the sides of the roads trimmed, and the trash removed so as not to constitute a fire menace. A considerable amount of dead and fallen wood was removed last winter by people who needed it. A patrol path was made completely around the entire 334 acres, and at Crooked Pond a section was cleared to give a full view of the pond and Bald Hill. An old trail on the south side of the pond was reopened and a new one established connecting the Crooked Pond section with the Hemlock Path in the newer area. This opens up a hitherto almost inaccessible area. An adjoining section of nearly nine acres was purchased with money given for that purpose, and the State now has full control of a meadow that may be easily flowed as an enticement to the ducks to drop in, and also makes water available for forest fire protection. Two excellent springs of water have been cleaned out, and the tile well at an abandoned camp has been thoroughly cleaned and provided with a cover. The fruit-bearing shrubs planted last year nearly all survived. This year Russian mulberry trees have been planted in several sections near the water supplies, where the berry-eating birds will find them, and a large number are ready for transplanting.

**KNIGHT WILD LIFE RESERVATION (MILK ISLAND).**—Two inspection trips to the island were made possible, in the spring, through the courtesy of Captain Corbett of the Straithmouth Coast Guard Station. Mr. Ernest Mills of the Federal Rodent Control went on the first trip carrying the latest equipment for the use of poisoned dust, and substantially reduced the rats which had survived or bred since the campaign of extermination some years back. The heavy tide



of last winter had strewn this small island with debris, which provided excellent hiding places where the rats might exist and breed unnoticed. Last winter's tides also removed all of the sand from the area which the terns used for nesting, leaving it now covered with boulders offering no inducement for the birds to nest. On the island is a small fresh-water pond, and at each visit fresh signs were seen showing that it is much used by black ducks and other birds that seek fresh water.

### *Martha's Vineyard Reservation*

The land formerly known as the heath hen reservation of Martha's Vineyard is now, as has been previously mentioned, a part of the Martha's Vineyard State Forest. On April 21, Dr. Alfred O. Gross of Bowdoin College, Brunswick, Maine, visited the locality and made the following report upon the heath hen, which aptly writes the last chapter of the valiant fight to save the heath hen from extinction.

"The following report of the heath hen situation for the year 1932-33 is made for the Division of Fisheries and Game, Boston, Massachusetts.

"The last heath hen apparently is dead and the race *Tympanuchus cupido cupido* extinct.

"The extinction of a race is a sad thought, yet the history of life in this world reveals an endless array of creatures which arose, flourished, declined and disappeared making room for the next species better adapted to the conditions of a changing environment. Many unique species have passed silently from the picture unnoticed and unmourned, but because of the unprecedented and combined efforts of the Massachusetts Department of Conservation, the Audubon Society, The Federation of the Bird Clubs of New England Inc., as well as that of many individuals, to prevent its extinction, the heath hen has been brought to public attention and its fight for existence has been given wide publicity.

"The tragedy was foreseen many years ago but in spite of all that man could do was not averted, thus amply demonstrating how helpless we are to preserve any wild species when once complicated environmental factors become antagonistic to its continuance. The various factors concerned in the decline and final extinction of the heath hen have been fully discussed in previous reports.

"The last authentic date of the appearance of the famous lone bird was March 11, 1932, when it was seen at the James Green Farm near West Tisbury. The bird was the sole survivor of his race since December, 1928, and was approximately ten years old. It was seen at its traditional "booming or courting field" at regular intervals between February 9 and March 11 of last year and then disappeared.

"Several persons reported seeing the bird during the past year, but these reports were not verified. Sheriff Thomas A. Dexter claims to have seen the bird on April 6, Edward T. Vincent on July 18, Jules Ben David on December 29, 1932, and Reverend A. Furness reported it as recently as January 18, 1933. An investigation of the matter reveals a strong probability that in all of these cases the last heath hen has been confused with ruffed grouse or the female and immature pheasants which were recently introduced to Martha's Vineyard Island. The pheasants are now abundant and have been seen in all places where the heath hen was reported, giving weight to the assumption. The grouse and especially the pheasants are very easily approached, whereas the heath hen was extremely wary. It is difficult even for an expert to differentiate and identify these birds, under the conditions in which they are seen in the field, without the use of blinds and powerful field glasses. Last year a Martha's Vineyard resident who presumably knew the heath hen perfectly through many years of experience pointed out a pheasant with the greatest assurance that it was the heath hen. The deputy warden, stationed on the Island, who knows the heath hen much better than the average person, sent me a box of feathers and remains of an immature pheasant which he thought to be those of a heath hen. These instances are cited not to belittle or to question the reliability of the observers, but they serve to emphasize the fact that the most experienced persons may be mistaken. It takes but little imagination, especially when the bird is seen but an instant, to make a heath hen out of a grouse or a female pheasant. I have



no doubt that similar erroneous reports of the heath hen will continue to be made by well meaning but inexperienced observers. Although many years have elapsed since the passenger pigeon passed into oblivion, scarcely a season goes by but some one who professes to know the bird well confuses it with the smaller but similar mourning dove and enthusiastically announces that the passenger pigeon is still alive. These reports are no longer taken seriously by ornithologists but nevertheless are annoying to the scientist who is attempting to record accurately the facts of a vanishing species.

"In order to complete the history of the heath hen it is important that some one discover and report the remains of the last bird. Fortunately the bird was marked on April 1, 1931, with two metal bands, furnished by the U. S. Biological Survey, Washington, D. C., which will make identification certain. An aluminum band number 407,880 was placed on the left leg and a copper band number A634,024 was fastened to the right tarsus. To stimulate interest among the inhabitants of Martha's Vineyard, a reward approximating \$100 is offered to the person who find and delivers the remains including one or both of the metal bands. This reward is sponsored by The Federation of the Bird Clubs of New England Inc., the Massachusetts Audubon Society, Thornton W. Burgess, Francis Foster, Alfred O. Gross and John A. Howland. The finding of the skeleton of the last bird will definitely close the chapter of the heath hen."

#### INLAND FISHERIES

##### *Public Fishing and Hunting Grounds*

The program for the establishment of public fishing grounds, begun in the summer of 1931, was continued along the same lines during the present year until the first of June, when the funds for acquiring new leases became no longer available. During this period many additional miles of excellent trout waters were opened to the anglers of the State.

The work of leasing additional streams had been started simultaneously on the Copcut and the Shingle Island Rivers in the eastern part of the State, and on the Farmington, Buck and Clam Rivers in the western part of the State, just before the opening of the fiscal year, Field Agent Howard handling the western project, and Field Agent Simpson the eastern. The land owners controlling the fishing rights on the stream covered by these two projects, felt that they would be much better off by having the State control the fishing, with its special warden patrol and system of posters directing the fishermen to and from the streams, and were, for the most part, glad to see the program go through. By the time the fishing season opened on April 15, approximately twenty-three miles of good trout fishing waters had been leased and posted as public fishing grounds on these two projects.

On April 15, work of establishing public fishing grounds on two sections of the Miller's River in northern Worcester County was begun, both field agents concentrating on this project, due to the short time available for this work. On the first section, lying between Athol and the village of South Royalston, nearly six miles of the seven-mile stretch were put under lease, the land owners being quite willing to have the stream controlled by the State. This stretch of trout water should appeal to the really ardent fisherman as it runs almost entirely through heavy wooded country, with only one road crossing it in its entire seven miles. On the second section of seven miles, lying between the Irving Paper Mills dam and the Millers Falls Paper Mill dam, several industries were encountered which for business reasons did not wish to lease, and only four and one-quarter miles were leased to the State. In fairness to the industries, however, it must be stated that, while not willing to lease, several of them were quite willing to allow the State to post the streams as being open to public fishing, as long as no damage was done.

This year also 9.4 miles of fishing ground were opened for the first time along the Squannacook River, on which the leases were acquired last year, but after the close of the fishing season. From the number of inquiries made during the past season concerning the location of this stream and the conditions to be found on it, there can be no doubt about its increasing popularity as a trout stream.

In addition to the public fishing grounds established on the above mentioned

streams during the past year, three more miles of State-leased waters were added on the Westfield River system.

The special appropriation for the establishment of public fishing grounds expired June 10, and the services of Field Agent Edwin P. Simpson were discontinued on June 1. As a result, further projects were set aside for the time being.

During the two-year period in which this work has been carried on, 79.7 miles of excellent trout stream were leased to the State and opened as public fishing grounds, divided as follows:

	Located in towns of —	Miles of public fishing ground (miles of stream accessible to fishermen)
Westfield River System:		
East Branch . . . . .	Huntington, Chesterfield, Cummington	20.8
Middle Branch . . . . .	Huntington, Chester, Becket, Middlefield	10.4
West Branch . . . . .	Huntington, Chester, Becket, Middlefield	6.4
Farmington River System:		
Farmington, Buck and Clam Rivers	Sandisfield, Tolland, Otis	12.05
Millers River:		
Athol to So. Royalston . . . . .	Athol, Phillipston, Royalston	5.85
Millers Falls to Erving . . . . .	Erving, Wendell, Montague	4.25
Squannacook River . . . . .	Townsend	9.4
Copecut and Shingle Island Rivers . . . . .	Dartmouth, Fall River	10.55
		<u>79.7</u>

A new activity, coming within the scope of public fishing grounds, was put into operation on June 27, when the work of establishing trout breeding areas on feeder streams to public fishing streams was begun. The Director, by Chapter 78, Acts of 1932, was given authority to close to all fishing, with the consent of the riparian land owners, feeder streams for use as breeder areas.

As a preliminary to the closing of the streams, the biologist of the Division made a study of each stream, to ascertain which would make the best breeding areas. Twenty-eight streams, all feeders to some one of the three branches of the Westfield River, were recommended for closing, and the past five months have been devoted to the task of calling on the land owners to get their consents to the closing of same. All of the streams recommended have been investigated at the present time, and two of them, representing approximately ten miles of stream, will be closed before the opening of the trout season next April.

On the remaining twenty-six streams not closed, it was impossible to get unanimous consents to the closing of the streams, and, as it was felt that in order to have the plan work successfully the stream must be closed completely, they were dropped from consideration. The commonest objection raised by land owners on these streams was, that they or their children liked to fish, and they could not see their way clear to giving up this privilege for five years. They were all willing to let the State close the stream, provided they themselves could have the right to continue to fish.

### *Ponds*

There is an apparent and marked increase in the public interest in the fisheries of the inland ponds, and heretofore the Division has not been able to keep pace with the demand for fish suitable for stocking the State's natural great ponds.

The present supply of fish for stocking is confined to the production of the Sutton State Pond System, and the fish resulting from the salvage operations in water supplies and other closed water areas. To supplement this supply, work was begun this year in the building of four artificial ponds in the Harold Parker State Forest at Andover, which when completed will afford approximately 100 acres of water which will be used for the production of pond fishes. The work on these ponds was performed by members of the Civilian Conservation Corps, stationed at the Forest, and although the cooperation at first was confined to the labor supplied by the Corps, materials being purchased by the Division, a plan



was worked out whereby the Federal government is now supplying the materials as well as the labor, for the construction of these ponds. The work is more than fifty percent completed at the close of this report.

A further testimony to the public interest in our natural great ponds is found in the report of the special commission designated under Chapter 10, Resolves of 1933, which is recommending that public rights of way be laid out to every natural great pond. They recommend, further, that natural great ponds containing between ten and twenty acres, in which some of the public rights, particularly in regard to fishing, have been restricted, be restored to full public ownership and control, the same as now obtains in the case of the great ponds containing more than twenty acres in their natural state.

The law already provides a method of establishing a public right of way to a great pond by special legislation in the case of each individual pond, following investigation and report of a joint committee upon petition of ten citizens. Under this method, access to a very limited number of ponds has been provided. During the 1933 session by enactment of Chapter 180 provision was made for the establishment of a right of way to Lake Marguerite (also called Simon's Pond) in the town of Sandisfield. A petition to provide a way to Lake George (also called Wales Pond) in the town of Wales, was reported on adversely, the committee finding that the public already has access to the pond.

**GREAT PONDS STOCKED AND CLOSED.**—Within the period of this report (Dec. 1, 1932 to Nov. 30, 1933) the following-named great ponds were stocked under Section 40, Chapter 131, General Laws, Ter. Ed., and regulations applied by the Director closing the ponds to fishing for the periods listed below, with penalty of twenty dollars for each violation of the regulations. This list does not include ponds on which similar regulations have been applied in past years, and which are still in effect.

Body of Water	Town	Regulations effective, both dates inclusive—
Asneconick Pond . . . .	Hubbardston . . . .	Nov. 1, 1933 to May 29, 1934 Nov. 1, 1934 to May 29, 1935 Nov. 1, 1935 to May 29, 1936
Stockbridge Bowl (also called Lake Mahkeenac and Big Pond) . . . .	Stockbridge . . . .	Nov. 1, 1933 to May 29, 1934 Nov. 1, 1934 to May 29, 1935 Nov. 1, 1935 to May 29, 1936

The regulations on Bare Hill Pond in the town of Harvard closing the pond and its tributaries to all fishing from Nov. 1, 1931 to May 29, 1932, and from Nov. 1, 1932 to May 29, 1933, were revoked, effective Jan. 3, 1933.

**BREEDING AREAS IN PONDS AND STREAMS.**—No additional breeding areas in great ponds were closed during the year.

An account of the closing of feeder streams to the waters which have been established as public fishing grounds has been given elsewhere in this report.

## PROPAGATION OF FISH AND GAME

### FISH HATCHERIES AND GAME FARMS—GENERAL

One of the most widely discussed subjects concerning the propagation of fish and game concerns the cost of producing pheasants and quail at the four game farms maintained by this Division. There is the opinion, in some quarters, that game birds cannot be propagated as cheaply at State-owned farms as they can be purchased in the open market.

From the beginning of his administration in 1931 the Director, with the cooperation of the men in charge of the various game farms, has been working unceasingly to bring down the cost of raising game birds. It must be borne in mind, however, that there are certain expenses in the nature of upkeep of the property which must be considered in the case of State game farms, as they are looked upon as a State institution and the public expects some degree of care of the buildings and grounds for the sake of appearance alone, which might not be true at some commercial farms. Following is a table showing the comparative costs of raising game birds at each farm during the four years beginning in 1930.



## COST OF PRODUCING PHEASANTS AND QUAIL

STATE GAME FARM AT—	COST				PRODUCTION				COST PER BIRD			
	1930		1931		1932		1933		1930		1932	
PHEASANTS												
Ayer	\$7,488.10 <sup>1</sup>	\$5,893.09 <sup>2</sup>	\$5,202.53 <sup>3</sup>	\$5,016.59	1,711	1,545	2,227	2,594	\$4.38	\$3.81	\$2.34	\$1.93
Marshfield	15,021.62	9,106.96	9,667.31	8,091.86	4,930	3,696	4,055	5,795	3.05	2.46	2.38	1.39
Sandwich	15,865.78	10,986.09	8,084.38	6,532.02	5,378	5,286	4,547	4,758	2.95	2.08	1.78	1.37
Wilbraham	15,892.76	9,853.88	7,936.78	6,779.89	5,101	4,732	6,309	6,754	3.12	2.08	1.26	1.00
	\$54,268.26 <sup>1</sup>	\$35,840.02 <sup>2</sup>	\$30,891.00 <sup>3</sup>	\$26,420.36	17,120	15,259	17,138	19,901	Division's cost per pheasant	\$2.35	\$1.80	\$1.33

## QUAIL

Ayer	\$2,025.14	\$4,682.81	\$3,938.65	\$2,586.28	116	148	1,038	1,112	\$17.46	\$31.64	\$3.79	\$2.32
Marshfield	3,512.90	9,480.91	5,400.07	2,024.40	303	1,209	781	573	11.59	7.84	6.91	3.53
Sandwich	4,370.94	6,838.97	4,813.63	6,161.50	359	1,519	2,102	2,434	12.18	4.50	2.29	2.53
Wilbraham	2,747.06	3,863.11	3,266.26	3,936.75	423	1,290	1,550	1,617	6.49	2.99	2.11	2.43
	\$12,656.04	\$24,865.80	\$17,418.61	\$14,708.93	1,201	4,166	5,471	5,736	Division's cost per quail	\$5.97	\$3.18	\$2.56

## COMBINED COST OF PHEASANTS AND QUAIL

Ayer	\$9,513.24 <sup>1</sup>	\$10,575.90 <sup>2</sup>	\$9,141.18 <sup>3</sup>	\$7,602.87	1,827	1,693	3,265	3,706	\$5.21	\$6.25	\$2.80	\$2.05
Marshfield	18,534.52	18,587.87	15,067.38	10,116.26	5,233	4,905	4,836	6,368	3.94	3.79	3.12	1.59
Sandwich	20,236.72	17,825.06	12,898.01	12,693.52	5,737	6,805	6,649	7,192	3.53	2.62	1.94	1.76
Wilbraham	18,639.82	13,716.99	11,203.04	10,716.64	5,524	6,022	7,859	8,371	3.37	2.28	1.43	1.28
	\$66,924.30 <sup>1</sup>	\$60,705.82 <sup>2</sup>	\$48,309.61 <sup>3</sup>	\$41,129.29	18,321	19,425	22,609	25,637	Division's cost per bird	\$3.13	\$2.14	\$1.60

1. The total cost was reduced by \$4,467.60 as credit for eggs shipped to sportsmen's clubs.

2. The total cost was reduced by \$3,642.00 as credit for eggs shipped to sportsmen's clubs.

3. The total cost was reduced by \$1,500.00 as credit for eggs shipped to sportsmen's clubs.

It will be noted that there has been a steady decrease in the cost of raising birds and that the present cost of raising birds on most of the game farms is below the price at which these birds could be purchased in open market.

It is not unusual, in the operation of four farms, that one or more of them might experience difficulty in a given year which would account for a higher cost of production at those particular farms.

The fact remains, however, that during the last three years, steady progress has been made in the way of decreasing the cost of producing the birds. It should be borne in mind also that these costs include the total cost of running each game farm during the entire twelve months of the year, and not merely the expense of operation during the actual hatching and rearing season.

As previously stated, the major activities at the fish hatcheries have been the reestablishment of these stations as independent producing units, and the development of each station to its capacity, together with the adoption of the selective breeding policy which should result in better fish of a faster-growing strain.

The following table shows the comparative expenses and production at the fish hatcheries during the past four years.

STATE FISH HATCHERY AT	EXPENDITURES AT THE FISH HATCHERIES				FISH DISTRIBUTED AND RESERVED FOR BROOD STOCK (These figures do not include young fish held for future distribution; fry transferred from station to station; or fish used for feeding experiments)			
	1930	1931	1932	1933	1930	1931	1932	1933
E. Sandwich . . . .	\$3,219.64	\$3,806.39	\$3,512.60	\$2,760.60	29,800 brk trt	21,479 brk trt 43,000 chinooks 1,375 seabago	56,902 brk trt 43,475 chinooks	50,025 brk trt
Montague . . . .	15,024.37 <sup>4</sup>	13,757.40 <sup>4</sup>	13,795.91 <sup>4</sup>	13,283.83 <sup>2</sup>	177,337 brk trt <sup>9</sup>	182,679 brk trt <sup>7</sup> 2,406 rnbw trt	285,002 brk trt 68,926 rnbw trt <sup>10</sup> 11	231,231 brk trt 38,784 rnbw trt
Palmer . . . .	8,248.41	8,995.29	7,493.98	6,194.90	45,650 brk trt 196,000 bass fry 52,650 bass fgs 7 bass adult 13,000 horn pout	39,505 brk trt <sup>8</sup> 174,000 bass fry 53,150 bass fgs 18 bass adult 3,000 horn pout 3,183 yel pch 7,250 blue gill 176 pickerel	105,141 brk trt 175,000 bass fry 35,375 bass fgs 1,822 horn pout 223 blue gill 355 pickerel 1,660 LM bass	74,432 brk trt 109,000 bass fry 26,500 bass fgs 1,500 horn pout
Sandwich . . . .	9,513.67	9,411.22	7,435.97	6,750.92	111,534 brk trt	181,506 brk trt	108,630 brk trt	170,245 brk trt 17,000 chinooks
Sunderland . . . .	10,196.85 <sup>4</sup>	16,983.83 <sup>4</sup>	14,020.08 <sup>4</sup>	19,237.04 <sup>4</sup>	60,000 brk trt 31,197 brn trt	63,670 brk trt 105,311 brn trt <sup>8</sup>	176,995 brk trt 55,100 brn trt <sup>9</sup>	148,850 brk trt 89,903 brn trt <sup>12</sup>
Sutton . . . .	10,577.95 <sup>11</sup>	10,969.57 <sup>11</sup>	12,365.27 <sup>11</sup>	7,754.15 <sup>4</sup>	33,575 brk trt	14,395 brk trt	33,809 brk trt <sup>7</sup> 14,310 brn trt <sup>8</sup> 520 rnbw trt <sup>10</sup>	61,032 brk trt 18,251 brn trt <sup>12</sup> 6,783 rnbw trt <sup>11</sup>
Sutton State Pond System	-	-	-	2,699.06 <sup>4</sup>	309,300 blue gill 179,323 crappie 259,142 horn pout 2,380 pickerel 76,597 yel pch 32 LM bass	221,172 blue gill 13,710 crappie 227,655 horn pout 2,093 pickerel 101,146 yel pch 2 LM bass	118,376 blue gill 23,539 crappie 309,462 horn pout 11,497 pickerel 279,014 yel pch	29 crappie <sup>8</sup> 83,231 horn pout <sup>5</sup> 318 pickerels <sup>8</sup> 174,344 yel pch <sup>8</sup>
Totals . . . .	\$56,780.89	\$63,923.70	\$58,623.81	\$58,680.50	457,896 brk trt 31,197 brn trt 196,000 bass fry 52,650 bass fgs 7 bass adult 309,300 blue gill 179,323 crappie 272,142 horn pout 2,380 pickerel	503,234 brk trt 105,311 brn trt 2,406 rnbw trt 174,000 bass fry 53,150 bass fgs 18 bass adult 228,422 blue gill 13,710 crappie 230,655 horn pout	766,479 brk trt 69,410 brn trt 69,446 rnbw trt 175,000 bass fry 35,375 bass fgs 118,599 blue gill 23,539 crappie 311,284 horn pout 11,852 pickerel	735,815 brk trt 108,154 brn trt 45,567 rnbw trt 109,000 bass fry 26,500 bass fgs 29 crappie <sup>8</sup> 84,731 horn pout <sup>5</sup> 318 pickerels <sup>8</sup> 174,344 yel pch <sup>8</sup>





The only land acquired was a two-acre piece at the Montague State Fish Hatchery, bought from Mr. Ralph Bitzer, for which \$100 was paid from State funds and \$100 paid direct to the seller by the League of Worcester County Rod and Gun Clubs, Inc.

Quail rearing methods were the same as in other years, but along with the use of the existing equipment of Coleman small outdoor brooders accommodating fifteen chicks each, experimental colony brooder houses were built and tried out at three stations. The results were most satisfactory, and the experience of the year would indicate that quail can be raised in large flocks, thereby reducing labor costs. As soon as funds will permit, it is probable that the Coleman type of electric brooders will be entirely supplanted by additional colony houses.

*East Sandwich State Fish Hatchery—Alfred C. Fish,  
Assistant Fish Culturist in Charge*

**NEW CONSTRUCTION.**—The foundation of the hatchery building, which had rotted away, was replaced with one of concrete, and the building reshingled. A garage was erected to house the truck, which is needed now that this station is operating as a separate unit.

**NEW EQUIPMENT.**—The 1930 Ford half-ton truck from the Sandwich State Game Farm was transferred to this station.

**BROOK TROUT.**—The year opened with 27,475 fingerling brook trout on hand, 4,950 of which were lost, 20,925 distributed to public waters, and 1,600 retained as the nucleus of a brood stock from which eggs were stripped in the fall of 1933. Of these, 415 were lost and 1,185 remain on hand November 30.

For the work of the year, 155,000 eggs were purchased, 105,000 of which were from adult fish and 50,000 from yearling fish. In addition, 25,000 eggs were received from the Montague State Fish Hatchery from yearling fish. Of the 180,000 eggs handled, 5,252 were lost and 174,748 fry hatched, of which 17,801 were lost, 27,500 distributed to public waters, and 129,447 reclassified as fingerlings. Of these, 24,814 were lost and 104,633 remain on hand November 30.

**CHINOOK SALMON.**—For the work of the season, 25,000 Chinook salmon eggs were received from the U. S. Bureau of Fisheries, State of Washington, in exchange for brook trout eggs purchased and sent to their Nashua, New Hampshire, station. 285 were lost and 24,715 fry hatched, of which 4,469 were lost and 20,246 reclassified as fingerlings. Of these, 6,227 were lost, and 14,019 remain on hand November 30.

After hatching, the Chinook salmon fry, which were placed in pools fed by natural spring water, started to die. Specimens were autopsied and the stomachs were found greatly distended and filled with a clear fluid, but no definite diagnosis could be made. One lot of salmon was removed from spring to well water. From that time on losses ceased among both lots of fish. About 5,000 salmon were carried in a pool fed by pond water, and shortly after being placed in this pool they began to disappear. Losses continued until the water was drawn down, and 19 fair sized eels, a half-pound trout and two six-inch trout and one seven-inch pickerel, were found and removed. These doubtless had gained entrance through the water supply pipe.

*Montague State Fish Hatchery—Ralph Bitzer,  
Fish Culturist in Charge*

**NEW CONSTRUCTION.**—All of the buildings were repainted.

Considerable work was done in rebuilding certain of the old pools in the pond area, putting in cypress sides to replace the dirt pools, together with concrete dams to replace the old wooden dams. In the back of the meat house the installation of concrete dams was completed and new turf put on the sides of the pools. This work puts this string of pools in good shape for several years.

The purchase of the two-acre tract at the lower end of the hatchery now gives a straight line to the railroad track with a right of way at the lower end. This area was developed into three large ponds, which will be used for the rearing of rainbow trout and will materially increase the station's output, particularly in respect to larger rainbow trout.

This station, for all practical purposes, has at last been developed to its full

capacity, and this new construction, apart from repair work noted above, represented the expenditure of \$2,602.60.

**NEW EQUIPMENT.**—A new oxygen tank was provided for this station, and the old one transferred to the Sutton State Fish Hatchery.

The one-ton White truck (1926 model) was traded in on a purchase for another station (Sandwich Game Farm).

**BROOK TROUT.**—Of the 150 adult brook trout on hand at the beginning of the year, 104 were lost, 21 distributed for display, and 25 distributed to open waters.

Of the 4,922 yearling brood stock on hand at the beginning of the year (a recount added 722 to the previous inventory), 716 were lost, 110 distributed for display, and 4,096 planted in open waters. Of this yearling brood stock, a total of 410,000 eggs were collected, of which 27,000 were lost, 245,000 transferred to other stations, and 138,000 retained.

The year opened with 55,400 fingerlings on hand (a recount added 10,400 to the previous inventory). Of these 38,450 were distributed to open waters, 13,300 to club rearing pools, 650 for display, and 3,000 retained for brood stock, from which eggs were stripped in the fall of 1933. Of this 3,000 brood stock, 650 were lost, 17 distributed for display, and 2,333 remain on hand November 30.

For the work of the year, 245,000 eggs were purchased from adult fish, to which were added 138,000 collected from the yearling brood stock at the station. Of the 383,000 eggs handled, 30,000 were lost, and 353,000 hatched, of which 49,000 were lost and 304,000 reclassified as fingerlings. Of these, 26,700 were lost, 62 distributed for display, 174,500 planted in open waters (19,000 2-in. to 3-in.; 131,500 4-in. to 6-in.; 24,000 6-in. or over), and 102,738 remain on hand November 30.

**RAINBOW TROUT.**—A brood stock of rainbow trout is maintained at this station. The year opened with 2,410 adults on hand, to which were added 5 adults from the Deerfield River. Of these, 173 were lost, 22 distributed for display, and 2,220 are on hand November 30.

The year opened with 50,725 fingerlings on hand, all of which were reclassified as yearlings. Of these, 38,700 were planted in public waters, 12 distributed for display, 494 lost, and 11,519 remain on hand November 30.

For the work of the season, 50,000 eggs were received early in December from the U. S. Bureau of Fisheries Station at White Sulphur Springs, W. Va., in exchange for which the Division purchased and shipped to their Nashua, N. H., station 50,000 brook trout eggs. From the middle of January to the middle of March, 85,000 eggs were collected from the brood stock at this station, making a total of 135,000 rainbow trout eggs handled. Of these eggs received and collected, 27,500 were lost, and 107,500 hatched, of which 17,300 were lost, 2,750 used for experimental purposes by the biologist, 50 distributed for display, and 87,400 are on hand November 30.

At the beginning of the summer, lights were placed over each of the larger ponds containing yearling rainbow trout, and one over one of the large ponds containing fingerlings, to attract insects to the ponds. The fish culturist made several night visits to the ponds to make observations on the amount of insect life attracted by these lights, and it is his opinion that considerable natural food is added to the daily ration by this method.

*Palmer State Fish Hatchery—William F. Monroe,  
Fish Culturist in Charge*

**NEW CONSTRUCTION.**—In addition to the usual routine work of replacing worn-out wooden dams with concrete dams, a concrete floor was laid in the hatchery building.

The State Department of Public Works completed the removal of all of their nursery stock from this area, and removed all of their buildings except a two-car garage, which will be rented as a part of the tenement property. The grounds were left in first-class shape, particularly in the area where buildings formerly stood.

**NEW EQUIPMENT.**—A 1933 Chevrolet 1½ ton truck replaced the old 1929 model Chevrolet, which was turned in.

An oxygen tank for distribution work was purchased.



**BROOK TROUT.**—The year opened with 5,200 fingerling brook trout on hand, 200 of which were lost, 4,000 planted in open waters, and 1,000 retained as the nucleus of a brood stock from which eggs were stripped in the fall of 1933. Of this 1,000 brood stock, 843 were killed by otter, 6 distributed for display, and 151 remain on hand November 30.

For the work of the season, 225,000 eggs (from adult fish) were purchased to which were added 150,000 eggs from yearling fish received from the Montague State Fish Hatchery. Of the 375,000 eggs handled, 13,752 were lost and 361,248 hatched. Of these, 10,744 were lost, 189,571 transferred to the Sunderland State Fish Hatchery, and 160,933 reclassified as fingerlings. Of these, 22,100 were lost, 70,426 distributed to public waters (36,000 1½-in.; 11,466 4 to 6-in.; 22,960 6-in. or over), and 68,407 remain on hand November 30.

**SMALL-MOUTH BLACK BASS.**—The season started with 300 adult brood fish on hand, to which were added 121 brood stock fish taken from salvage jobs. Of these, 155 were lost, and 266 remain on hand November 30.

From the bass ponds there were collected and distributed to open waters 109,000 fry and 26,500 fingerlings.

Fewer breeders were available to fully stock the culture ponds, and as a result the output of both fry and fingerlings was less than in 1932. However, the fingerlings produced were larger than in previous years, and many attained a size of 6 inches or better.

A careful study was made of the small-mouth black bass work at this hatchery, as a result of which it is planned to discontinue the distribution of fry, both because of the uncertain results from restocking with this size fish, and the expense involved. Future bass work will be confined to the production of fingerling fish which will be distributed in the early fall, and it is hoped that even better results will be obtained than by the past policy of distributing both fry and fingerlings.

**HORNED POUT.**—From the supply ponds 1,500 horned pout fingerlings were distributed to open waters.

*Sandwich State Fish Hatchery—Irving E. Lewis,  
Fish Culturist in Charge*

**NEW CONSTRUCTION.**—The principal item of work was the building of a concrete foundation under the hatchery building, as the wooden one had rotted badly during the past two or three years.

**NEW EQUIPMENT.**—A new oxygen tank was purchased for the distribution work. A new cement trough 12 x 5 ft. was added to the hatch house equipment to be used in connection with taking eggs and filling oxygen tank.

**BROOK TROUT.**—The year opened with 142,400 fingerlings on hand (a recount having added 10,600 to the previous inventory), of which 1,355 were lost, 128,300 planted in open waters, 7,750 distributed to club rearing pools, and 4,995 retained for brood stock from which eggs were stripped in the fall of 1933. Of this 4,995 brood stock, 185 were lost, and 4,810 remain on hand November 30.

Of the 446 adult brood stock on hand at the beginning of the year, 79 were lost and 367 remain on hand November 30.

For the work of the year, 370,000 eggs were purchased (270,000 from adult and 100,000 from yearling fish). In addition, 60,000 eggs were collected from the adult fish at this station, making a total of 430,000 eggs handled. Of these, 11,151 were lost and 418,849 hatched. Of the number hatched, 169,300 were lost and 249,549 reclassified as fingerlings, 79,000 of which were lost, 29,200 planted in open waters, and 141,349 remain on hand November 30.

**CHINOOK SALMON.**—25,000 Chinook salmon eggs were received from the U. S. Bureau of Fisheries, State of Washington, in exchange for brook trout eggs purchased and sent to their Nashua, N. H., station. Of these, 52 were lost and 24,948 hatched. Of the fry hatched, 6,131 were lost, and 18,817 reclassified as fingerlings, of which 827 were lost, 17,000 planted in public waters, and 990 are on hand November 30.

*Sunderland State Fish Hatchery—Ludwig Horst,  
Fish Culturist in Charge*

**NEW CONSTRUCTION.**—The largest hatchery development of the year was made at this station. A special construction superintendent with a large crew of

men from the local welfare list, went to work on this area the middle of April and completed four lines of pools, 350 ft. long, of the usual type of cypress construction. This develops the entire Graves tract, with the exception of a small section of the open field which may be developed later if the water supply proves adequate. On the Graves tract also a new hatchery was built and completely equipped, to take care of the increased production, as the present hatchery is sufficient to take care of only the brook trout work, whereas the new hatchery building will be devoted entirely to brown trout work.

The development of the Hubbard tract was completed by the construction of one more pool.

The work outlined above represented the expenditure of approximately \$10,000, but is of particular importance due to the fact that there is an increasing demand for brown trout, which are hatched and reared only at this station. The changing biological conditions of many of our streams have rendered them unsuitable for brook trout, resulting in an increased demand for brown trout. Because of the fact that these fish cannot be reared for distribution in a single season, it is imperative that a larger area be made available for the proper rearing of them.

The foregoing work completes the development of this station.

During the winter months five holding boxes were constructed. These, with three sorting troughs, were set up during the summer, and the shipping stand was completed. The old meat house, shipping stand and holding boxes, which had become obsolete, were taken down. A number of sorting boxes 18 x 12 x 8 inches were built, using brass rods as spacers, and have proved of value in sorting the fish.

**BROOK TROUT.**—The year opened with 25,150 fingerlings on hand, of which 23,150 were planted in open waters and 2,000 retained as the nucleus of a brood stock from which eggs were collected in the fall of 1933. 150 more of these fish were found to be on hand at a later date, making a total of 2,150 brood stock, of which 6 were lost, and 2,144 remain on hand November 30.

For the work of the year, 189,571 fry were received from the Palmer State Fish Hatchery the middle of April, of which 10,000 were lost and 179,571 reclassified as fingerlings, of which 2,521 were lost, 125,700 planted in open waters, and 51,350 remain on hand November 30.

Two ponds of brook trout were experimentally fed with dried salmon eggs, resulting in a very satisfactory growth and color.

**BROWN TROUT.**—The year opened with 743 adult brown trout on hand (recounts having added 244 to the previous inventory). To these were added 300 fish (1932 hatch) on hand at the beginning of the year, making a total of 1,043 brood stock, of which 5 were lost, 471 distributed to open waters, 44 distributed for display and study purposes, and 523 remain on hand November 30.

Of the 115,098 fingerlings on hand at the beginning of the year (a recount having added 10,098 to the previous inventory), 25,000 were transferred to the Sutton State Fish Hatchery, 25,000 planted in public waters, 30 distributed for display, and 65,068 reclassified as yearlings, of which 810 were lost, 63,950 planted in open waters, 8 distributed for display, and 300 remain on hand November 30.

For the work of the year, 100,320 brown trout eggs were received from the U. S. Bureau of Fisheries station at Bozeman, Mont., in exchange for brook trout eggs purchased and sent to their Nashua, N. H., station. 400,000 eggs were collected from the brood stock at the station, making a total of 500,320 eggs handled, of which 115,320 were lost, 1,000 distributed for study, and 384,000 hatched. Of these, 125,000 were lost as fry, 1,500 used by the biologist for experiment, 350 distributed for study purposes, and 257,150 reclassified as fingerlings. Of these, 32,550 were lost, 1,000 used by the biologist for experiment, 50 distributed for display, and 223,550 remain on hand November 30.

Very satisfactory results were obtained at this station by feeding, during the summer months, a mixture of dried salmon eggs and liver. The fish made an unusually good growth on this combination. By mixing the eggs with the liver, the meat juices, which otherwise would have been lost, were absorbed.



*Sutton State Fish Hatchery—Arthur Merrill,  
Fish Culturist in Charge*

In order that he might undertake special work in connection with the development of a pond system in the Harold Parker State Forest, advise on pond construction by the Civilian Conservation Corps in other State Forests, and assist the biologist on other projects, Fish Culturist Merrill was temporarily relieved of his duties at this station, which for the time being was placed in charge of Mr. Michael O'Mara, Assistant Fish and Game Culturist.

**NEW CONSTRUCTION.**—The grounds were thoroughly cleared of all waste material. Unused buildings were demolished, unnecessary and unsightly fences taken down, and the boundary fences repaired. Two large pine trees near the ice house were cut down and turned into some two thousand feet of lumber. Another large tree near the barn, which had been gradually destroying the cellar wall, was cut down and a cement foundation built to replace the damaged brick wall.

All the buildings at this station were repaired and repainted.

At the lower end of the watershed three new pools were constructed to be used for brown trout. This develops the Division's holdings straight down to the line, and makes use of the entire water supply.

A gravel road was made to four rebuilt rainbow and brown trout ponds at the lower end of the system, to give access with a truck when transferring fish.

As this hatchery is entirely separated from the pond system, the men assigned to this station now work exclusively on hatchery work, and are no longer called upon to do any work at the Sutton Ponds.

**NEW EQUIPMENT.**—The White truck (1927 model) was traded in for a 1½ ton Ford truck, and the small Ford truck assigned to the Sutton State Pond System. The oxygen tank formerly used at the Montague State Fish Hatchery was transferred to this station.

**BROOK TROUT.**—The year opened with 52,000 fingerlings on hand, of which 49,700 were planted in open waters, 1,400 lost, and 900 retained as the nucleus of a brood stock from which eggs were collected in the fall of 1933. These, added to the 300 adult brood stock on hand at the beginning of the year, made a total of 1,200 brood stock, of which 650 were lost, 344 distributed to public waters, 88 distributed for display and experimental purposes, and 118 remain on hand November 30.

For the work of the year 105,000 eggs from adult fish were purchased, to which were added 70,000 eggs from yearling fish received from the Montague State Fish Hatchery, and 21,000 eggs collected at the station, making a total of 196,000 eggs handled. Of these, 10,000 were lost and 186,000 hatched. 19,000 of these fry were lost, 10,000 distributed to public waters and 157,000 transferred to fingerlings. 39,700 were lost as fingerlings and 117,300 remain on hand November 30.

**BROWN TROUT.**—76 adult brown trout were found to be on hand and were distributed to open waters.

For the work of the year, 25,000 brown trout fingerlings were received from the Sunderland State Fish Hatchery in December. Of these, 6,825 were lost and 18,175 distributed to public waters as yearlings.

**RAINBOW TROUT.**—33 adult rainbow trout were found to be on hand and were distributed to public waters.

Of the 8,900 fingerlings on hand at the beginning of the year, 2,150 were lost, 50 distributed for experimental purposes, and 6,700 distributed to public waters.

*Sutton State Pond System—in Charge of Mr. Elmer Clapp*

The Sutton Ponds, formerly operated as a part of the Sutton State Fish Hatchery, have been established as a separate unit with the above designation. It became obvious that these ponds could not be adequately operated in conjunction with the hatchery, and the change has been beneficial to the operation of both ponds and hatchery.

**NEW CONSTRUCTION.**—The general appearance of the grounds has been improved by a general cleaning up, removal of dead trees and brush, replacement of unsightly fences, grading and laying out the grounds.



Around the pond area considerable work was done in the way of cleaning up the wooded areas.

The old camp was remodeled to serve as a headquarters. The other building on the property was made into a workshop, and a garage was erected to house the truck transferred from the Sutton State Fish Hatchery.

The main fish trap was reconstructed to facilitate the catching and distribution of the yearly output, and as a result the distribution was effected more rapidly and thoroughly than previously.

**NEW EQUIPMENT.**—The half-ton Ford truck (1931 model), formerly at the Sutton State Fish Hatchery, was transferred to the ponds.

Five of the ponds were drawn off in the fall of 1933, and before any fish were distributed to open waters, the proper quantities of brood stock and fingerling fish in combination were returned to the ponds for next season's breeding and production. A chart of the pond unit was prepared for the fish culturist in charge, on which was carefully worked out, based on the acreage of the ponds, the proper amounts and combinations to return. It was not possible, in case of every pond, to return the full number of fish scheduled, for when drawing off the ponds a considerable shortage was found of certain species and sizes.

Because of this careful restocking with breeders, fewer fish were planted in open waters, but it will ultimately result in bringing the production of these ponds up to the maximum.

In drawing off the ponds, crappie came through in small numbers and the adult fish were returned to the ponds for breeding. There were very few fingerlings and yearlings, and the fingerlings appeared to be undernourished and weak. Fingerling horned pout did not come through in the quantity anticipated, considering the number of breeders taken from the ponds. While fingerling, yearling and adult yellow perch showed up in large quantities, there were not enough of the adult size to return to the ponds, based on the chart prepared.

An early freeze-up handicapped the crew working at the ponds, and at the finish it was necessary to cut ice from the trap to remove the fish for distribution.

The ponds yielded for distribution to open waters, club rearing pools and for display and study for the period of this report, 257,922 pond fish, divided as follows: 83,231 horned pout, 29 crappie, 318 pickerel, 174,344 yellow perch.

Six pairs of wild black ducks were purchased and liberated on the ponds in the early spring and allowed to propagate naturally. As a result, 39 young birds were raised, and migrated during the early fall. This experiment indicates that a further use of these ponds may be possible as a nesting and breeding ground for water fowl, and this will in no way interfere with the primary purposes of the ponds for fish propagation.

### *Work of the Salvage Units*

Both salvage units are now well equipped for their work, each having a two-ton Dodge truck equipped with an oxygen tank. This year the Chevrolet Coaches of 1928 and 1929 were turned in, and new Ford Sedans provided for use in prospecting for seining possibilities.

Unit No. 1 operated in the eastern, and Unit No. 2 in the western part of the State. There was a fair run of white perch at the Cape, and considerable stocking of inland ponds was done with this species, over a wide territory.

A larger number of fish than usual were taken, since more could be moved with the aid of the two tank trucks. This was especially the case in the white perch work from Indian Lake. With the old system of cans, two trucks would have been able to move less than 50,000, as against over 100,000 with truck distribution. The oxygen tanks worked very advantageously in preserving the fish in transit.

The complete schedule of salvage jobs by both units for securing both white perch and pond fish, follows:

#### *Salvage Unit No. 1—William H. Seaman, Fish Culturist in Charge*

Oyster Pond, Falmouth, April 11 to 24. 41,825 yellow perch, 29,625 white perch, planted in open waters. Total—71,450.

Salt Pond, Falmouth, April 25 to May 5. 70 horned pout, 4,500 yellow perch, 56,250 white perch, planted in open waters. Total—60,820.

Weymouth Great Pond, Weymouth, May 9 to 18. 6,615 horned pout, 380 pickerel, 11,150 yellow perch, 1,185 white perch, 1,725 small mouth black bass, planted in open waters. In addition, 315 small mouth black bass, 135 horned pout, 90 pickerel, 315 yellow perch, 18 white perch and 27 sunfish were collected in September and were used for exhibition purposes. Total—21,955.

Great Quittacas Pond, Lakeville, Middleborough, Rochester, May 22 to 29. 530 horned pout, 110 pickerel, 450 yellow perch, 5,350 white perch, 58 small mouth black bass, planted in open waters. In addition, 25 small mouth black bass were sent to the Palmer State Fish Hatchery for breeding purposes. Total—6,523.

Wenham Lake, Wenham and Beverly, May 31 to June 7. 125 horned pout, 175 pickerel, 325 yellow perch, 3,985 white perch, 140 small mouth black bass, planted in open waters. Total—4,750.

Butler Ames Pond, Tewksbury, June 8 to 17. 31,050 crappie, 850 horned pout, planted in open waters. Total—31,900.

Long Pond, Falmouth, June 22 to 28. 1,950 small mouth black bass planted in open waters. In addition, 96 small mouth black bass were sent to the Palmer State Fish Hatchery for breeding. Total—2,046.

### *Salvage Unit No. 2—Elmer A. Macker, Fish Culturist in Charge*

From April 19 to May 6 at Belchertown State School Pond, Belchertown, Ludlow Reservoir, Ludlow, and the Springfield Ice Company's Pond (known as Morgan Road Ice Pond), West Springfield, as follows:

Belchertown State School Pond. 83,000 horned pout, planted in open waters. Total—83,000.

Ludlow Reservoir. 1,389 horned pout, 208 pickerel, 3,001 yellow perch, 810 small mouth black bass, planted in open waters. Total—5,408.

Springfield Ice Company's Pond (Morgan Road Ice Pond). 27,500 horned pout, 17,500 yellow perch, planted in open waters. Total—45,000.

Indian Lake, Worcester, May 16 to June 5. 102,500 white perch, planted in open waters. Total—102,500.

Ashley Reservoir, Washington, June 8 to 16. 20 horned pout, 31 pickerel, 1,150 yellow perch, planted in open waters. Total—1,201.

No Town Reservoir, Leominster, June 19 to 24. 50 horned pout, 19 pickerel, 50 yellow perch, planted in open waters. Total—119.

Elm Park Pond, Worcester, June 27 to 29. 600 crappie, 2,400 horned pout, 750 yellow perch, planted in open waters. Total—3,750.

### *Miscellaneous Salvage*

Several smaller lots of miscellaneous fish were salvaged by the wardens and the fish planted in local ponds:

From a pond in Forest Park, Springfield—400 horned pout. Total—400.

From Meadowbrook Flowage Basin, Amesbury—2 calico bass, 10 horned pout, 4 pickerel, 4,974 yellow perch, 10 white perch. Total—5,000.

From Shaker Pond, Ayer—6,500 horned pout. Total—6,500.

The salvage operations resulted in the collection of 452,322 fish (440,422 by the salvage units and 11,900 from the miscellaneous jobs by wardens).

Of the 452,322 fish salvaged, 451,301 were distributed to open waters, 121 to the Palmer State Fish Hatchery for breeders, and 900 for exhibition purposes.

### *Ayer State Game Farm—Edward E. Backus, Game Bird Culturist in Charge*

NEW CONSTRUCTION.—Three additional portable pheasant units were built, bringing the equipment up to twenty units.

A colony quail house 20 x 20 ft. was constructed, and equipped.

PHEASANT BREEDING.—The year opened with 322 pheasants on hand (216 of the old brood stock and 106 of the 1932-hatched birds). Of these, 13 were lost prior to the breeding season, leaving 309 on hand.

While the first eggs were collected during the week of April 8, no incubators



were set until the week of April 15. A total of 17,047 eggs were collected, of which 4,722 were discarded and 12,325 set in incubators.

Of the eggs set, 3,171 proved to be infertile, 3,021 contained dead embryos or otherwise failed to hatch, and 6,133 hatched. To these were added 8 pheasants brought to the station by wardens, making a total of 6,141 birds. Of these, 3,539 were lost, 2,226 liberated in covers, and 376 turned over to the sportsmen's clubs for wintering.

Of the 309 adults on hand at the beginning of the laying season, 6 were lost and 303 remain on hand November 30. Sudden changes in temperature from excessive heat to unseasonable cold accompanied by violent rains were responsible for the loss of a large number of pheasants after the birds had been moved from the breeding units to open range pens for the final finishing and hardening period before distribution.

**QUAIL BREEDING.**—The year opened with 511 adult quail on hand (23 of the old brood stock and 488 1932-hatched birds). To these were added 100 quail purchased the latter part of March. During the winter and spring, 48 were lost, 434 distributed to covers, and 129 are on hand at the beginning of the laying season. The first eggs were collected during the week of May 6 and the last eggs were collected during the week of September 23. A total of 4,129 eggs were collected, 211 of which were discarded, 63 broken and 3,855 set in incubators. Of the number set, 1,840 proved to be infertile, contained dead germ or otherwise failed to hatch, and 2,015 hatched. Of these, 903 were lost, 680 liberated in covers, and 432 are on hand November 30.

Of the 129 brood stock on hand at the beginning of the laying season, 11 were lost, 48 liberated in covers, and 70 remain on hand November 30.

One feature of exceptional interest at this station is the radical change in the method of propagating quail. This year for the first time every branch of the quail breeding and rearing was conducted entirely off the ground, with very satisfactory results as regards the prevention of disease.

*Marshfield State Game Farm—L. B. Sherman, Game Bird  
Culturist in Charge*

**NEW CONSTRUCTION.**—Beyond the construction of additional growing pens and other quail equipment, no development was carried on at this station.

In the new building erected last year, a portion of the cellar was partitioned off (10 x 40 ft.) for use as an incubator cellar, accommodating 4 Buffalo electric incubators and 5 Prairie State incubators.

A survey of the land owned at this station, made in 1932, had shown that a building owned by Mr. L. B. Sherman, the Game Bird Culturist, was partly on the State land. This was rectified by legislation authorizing the sale of 1306 square feet of land to Mr. Sherman for \$25. A fence was erected along the west side of the game farm, separating the State land from that owned by the railroad and by Mr. Sherman.

**PHEASANT BREEDING.**—The year opened with 440 pheasants on hand (190 of the old brood stock and 250 1932-hatched birds).

The first eggs were collected during the week of April 8, and the last eggs were collected during the week of July 15. A total of 16,274 eggs were collected, of which 135 were used for feeding birds and 16,139 were set. Of these, 7,328 proved infertile and 8,811 eggs hatched, to which were added 6 brought to the station by a warden, making a total of 8,817. Of these, 3,016 were lost, 4,682 liberated in open covers, 829 turned over to the sportsmen's clubs for wintering, and 290 remain on hand November 30.

Of the 440 adults on hand at the beginning of the laying season, 40 were lost, 177 liberated in covers, and 223 remain on hand November 30.

**QUAIL BREEDING.**—The year opened with 118 quail on hand (57 of the old stock and 61 of the 1932 hatch). To these was added one cock donated to the station, and 100 quail purchased the latter part of March.

Up to the beginning of the laying season, 11 birds were lost, 58 liberated in covers, and 150 on hand.

The first eggs were found on April 12, but none were collected until May 8. The last eggs were collected the week of September 2. A total of 3,107 eggs



were collected, to which were added 55 eggs given to the station, making a total of 3,162 eggs set in incubators, of which 2,030 were infertile and 1,132 hatched. To this number were added 23 quail brought in by wardens, making a total of 1,155 young birds handled. Of these, 559 were lost, 520 liberated in covers, and 76 remain on hand November 30.

Of the 150 adults on hand at the beginning of the laying season, 41 were lost, 55 liberated in covers, and 54 remain on hand November 30.

*Sandwich State Game Farm—Harry A. Torrey, Game Bird  
Culturist in Charge*

**NEW CONSTRUCTION.**—The old storage building was reconstructed to provide a garage for the new truck, and for the tractor. A small building (12 x 12) was rebuilt to be used for storage. A 20 x 20 ft. building for a colony quail experiment was erected. The dyke road from the State road was rebuilt. The work of painting all buildings and yards white has been practically completed.

**NEW EQUIPMENT.**—A new 1½-ton Ford truck replaced the small truck which was transferred to the East Sandwich State Fish Hatchery.

**PHEASANT BREEDING.**—The year opened with 284 pheasants on hand (110 of the old brood stock and 174 of the 1932 hatch). To these were added during the winter 125 adult birds which were purchased. Of these, 10 were lost prior to the breeding season, leaving 399 on hand.

The first eggs were collected during the week of April 8 and the last eggs during the week of July 15. A total of 11,430 eggs were collected, all of which were set. Of these, 4,151 proved to be infertile and 7,279 hatched, to which were added 84 birds purchased in August and 30 purchased in September. 2,521 were lost, 4,236 liberated in covers, 418 distributed to the sportsmen's clubs for wintering, and 218 remain on hand November 30.

Of the 399 adults on hand at the beginning of the laying season, 74 were lost, 149 liberated in covers, and 176 remain on hand November 30.

**QUAIL BREEDING.**—The year opened with 538 quail on hand (74 of the old brood stock and 464 of the 1932-hatched birds—a recount having added 13 to the previous inventory). To these were added 100 birds purchased the latter part of March.

Prior to the laying season, 33 birds were lost, 451 liberated in covers, and 154 were on hand.

Eggs were collected from the week of May 6 through the week of September 16. A total of 6,259 eggs were collected and set in incubators. Of these, 1,874 proved to be infertile and 4,385 hatched. 1,951 were lost (1,000 of these were from an epidemic of Blackhead which made its appearance about the first of July and which is discussed in more detail under Biological work), 2,130 liberated in covers, and 304 are on hand November 30.

Of the 154 adults on hand at the beginning of the laying season, 30 were lost, 50 liberated in covers, and 74 remain on hand November 30.

*Wilbraham State Game Farm—Frederick W. Wood, Game Bird  
Culturist in Charge*

**NEW CONSTRUCTION.**—A quail colony house was constructed. The foundation was built for a new 220-foot brooder house, to replace individual brooder houses that were no longer profitable to repair. The dwelling house was repaired, including shingling and rebuilding the chimneys from the roof up. The chimney on the shop was rebuilt.

**NEW EQUIPMENT.**—A Shaw 2 horse-power Du-all cultivator, with cutter bar attachment, was bought.

**PHEASANT BREEDING.**—The year opened with 465 pheasants on hand (65 of the old brood stock and 400 birds of the 1932 hatch).

Prior to the breeding season, 26 birds were lost and 439 remained on hand.

Eggs were collected from the week of April 8 through the week of August 5. A total of 22,263 eggs were collected, of which 3,811 were used for feeding birds and 18,452 set. Of these, 8,337 proved infertile and 10,115 hatched, of which 3,361 were lost and 6,754 were reared.

Of the 6,754 birds reared, 5,363 were liberated in covers, 1,316 distributed to clubs for wintering, and 75 remain on hand November 30.

Of the 439 adults on hand at the beginning of the laying season, 9 were lost, 4 liberated in covers, and 426 remain on hand November 30.

**QUAIL BREEDING.**—The year opened with 462 quail on hand (62 of the old brood stock and 400 birds of the 1932 hatch). To these were added 100 purchased the latter part of March.

Prior to the breeding season, 139 birds were lost, 299 liberated in covers, and 124 were on hand.

Eggs were collected from the week of May 6 to the week of September 30, inclusive. A total of 3,822 eggs were collected and set, of which 1,215 proved to be infertile and 2,607 hatched. Of these, 990 were lost, 1,150 liberated in covers, and 467 remain on hand November 30.

Of the 124 birds on hand at the beginning of the laying season, 4 were lost, 44 liberated in covers, and 76 remain on hand November 30.

Terrific storms during August and September caused heavy losses among the young pheasants carried in range pens, and also among the young quail.

## FISH AND GAME DISTRIBUTION

In addition to the fish and game propagation at the State-owned hatcheries and farms, a large amount was purchased from the commercial breeders. Because of general economic conditions a special effort was made to reserve some of the limited funds of the Division to assist the private dealers in the disposition of their surplus stock, as well as to supplement the shipments from the State-owned stations.

The value of this program is best demonstrated by the necessity of going outside of the State to purchase the balance of the game birds required, as the entire surplus of Massachusetts breeders had been previously purchased. Following is a statement of the purchases made, which required an expenditure of approximately \$20,000. Pheasants, 3,722; quail, 2,450; white hares, 5,251, cotton-tail rabbits, 1,193; pickerel, 6,555 fingerlings and 300 yearlings, and brook trout, 90,050 (6-inch). A small number of the pheasants and quail were held at the farms for addition to brood stock.

Conferences were conducted again in each county early in the year by the Supervisor of Distributions, at which were present delegates from the fish and game clubs and the State fish and game wardens.

The purpose of these gatherings was to select suitable waters and covers in each county to be stocked during the year. These contacts with the sportsmen's organizations have proved helpful to all concerned, and the distribution of fish and game during the year was carried on effectively.

The addition of three oxygen tanks to the trucks at the Montague, Sandwich and Palmer State Fish Hatcheries, and the transfer of the one formerly at Montague to the Sutton State Fish Hatchery, completes the distribution equipment. Each fish hatchery truck is now equipped with a serviceable and practical tank of the most modern type.

**BROOK TROUT.**—There were distributed from the State hatcheries and from fish purchased 99,212 fish 1 to 4 in.; 557,441 fish 4 to 6 in.; and 161,717 fish 6 inches and over.

At the close of the year there are on hand at all the stations 585,777 fingerlings, 10,741 yearlings, and 367 adults.

**BROWN TROUT.**—From both the Sunderland and Sutton State Fish Hatcheries there were distributed 350 fry; 25,080 fish 2 to 3 in., and 82,724 fish 6 inches and over.

At the close of the year there are on hand at the Sunderland State Fish Hatchery 223,550 fingerlings, 300 yearlings, and 523 adults.

**RAINBOW TROUT.**—From both the Montague and Sutton State Fish Hatcheries there were distributed 50 fish 3 in.; 9,675 fish 5 to 6 in., and 35,842 fish 6 in. and over.

At the close of the year there are on hand at the Montague State Fish Hatchery 87,400 fingerlings, 11,519 yearlings, and 2,220 adults.

**CHINOOK SALMON.**—From the Sandwich State Fish Hatchery there were distributed 17,000 fish 4 to 6 in.



At the close of the year there are on hand at both the Sandwich and East Sandwich State Fish Hatcheries 15,009 fingerlings.

**SMALL-MOUTH BLACK BASS.**—The entire production of bass at the Palmer State Fish Hatchery was liberated in suitable waters. In addition, 121 breeders were collected in the salvage operations.

At the close of the year there are on hand at the Palmer State Fish Hatchery 266 adult brood stock.

**MUSKALLONGE.**—The New York Conservation Commission furnished 20,000 muskallonge fry which were planted in various locations on the Connecticut River upon arrival.

**WALL-EYED PIKE.**—The New York Conservation Commission also furnished 500,000 wall-eyed pike perch fry, which were planted, upon arrival, in suitable waters.

**CRAPPIE, HORNED POUT, PICKEREL, YELLOW PERCH, WHITE PERCH.**—Pond fish of various species were distributed to open waters, club rearing pools, and for display. From the Sutton State Pond System were distributed a total of 257,922 as follows: 83,231 horned pout, 29 crappie, 318 pickerel, 174,344 yellow perch. From the salvage units and miscellaneous salvage jobs, 31,652 crappie, 129,594 horned pout, 1,017 pickerel, 85,990 yellow perch, 198,923 white perch, 5,119 small-mouth black bass, 27 sunfish. From the Palmer State Fish Hatchery, 1,500 horned pout. From a sportsmen's club 6,855 pickerel were purchased and distributed.

**PHEASANTS.**—The practice of other years of distributing pheasant eggs to the sportsmen's organizations and individuals for hatching and rearing of young chicks to maturity before liberation was discontinued as the results obtained did not justify its continuance.

There were 19,446 young and 330 adult pheasants distributed from the game farms, either directly to the covers or to the clubs for wintering. (See table.) In addition, 3,290 young and 193 adult pheasants purchased were released in covers.

At the close of the year there are on hand at the four game farms 583 birds (1933 hatched), and 1,128 adults.

**QUAIL.**—There were 4,480 young quail and 1,439 adult quail distributed to open covers from the four game farms. In addition, 2,050 quail were purchased and distributed to open covers. (See table.)

At the close of the year there are on hand at the four game farms 1,279 birds (1933 hatched), and 274 adults.

**WHITE HARES.**—There were 5,251 white hares imported after the close of the Massachusetts season, and these were all released in open covers.

**COTTON-TAIL RABBITS.**—Penikese Island supplied 382 live cotton-tails for restocking the mainland. In addition, 74 were trapped on closed areas, and 1,193 were purchased from out-of-state trappers. These were all released in open covers.



## FISH DISTRIBUTION FOR THE PERIOD DECEMBER 1, 1932 TO NOVEMBER 30, 1933

This table does not show stock transferred from one station to another, eggs exchanged with the U. S. Bureau or other State Commissions, nor does it show additions to brood stocks.)

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCTS (SEINED, PURCHASED, GIFT, ETC.)			Grand total
	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	
brook Trout:							
1-4 in. . . . .	99,150	-	62	-	-	-	99,212
4-6 in. . . . .	535,741	21,050	650	-	-	-	557,441
6 in. and over . . . .	71,425	-	242	90,050	-	-	161,717
Total Brook Trout . .	706,316	21,050	954	90,050	-	-	818,370
Brown Trout:							
Fry . . . . .	-	-	350	-	-	-	350
2-3 in. . . . .	25,000	-	80	-	-	-	25,080
6 in. and over . . . .	82,672	-	52	-	-	-	82,724
Total Brown Trout:							
Fry . . . . .	-	-	350	-	-	-	350
Fish 2 in. and over . .	107,672	-	132	-	-	-	107,804
Rainbow Trout:							
3 in. . . . .	-	-	50	-	-	-	50
5-6 in. . . . .	9,675	-	-	-	-	-	9,675
6 in. and over . . . .	35,758	-	84	-	-	-	35,842
Total Rainbow Trout . .	45,433	-	134	-	-	-	45,567
Chinook Salmon:							
4-6 in. . . . .	17,000	-	-	-	-	-	17,000
Small-mouth Black Bass:							
Fry up to 1 in. . . . .	109,000	-	-	-	-	-	109,000
Under 6 in. . . . .	26,500	-	-	-	-	-	26,500
6 in. and over . . . .	-	-	-	1,254	-	315	1,569
12 in. and over . . . .	-	-	-	3,429	-	-	3,429
Total Small-mouth Black Bass:							
Fry up to 1 in. . . . .	109,000	-	-	-	-	-	109,000
1 in. and over . . . .	26,500	-	-	4,683	-	315	31,498
Crappie:							
Under 6 in. . . . .	29	-	-	600	-	-	629
Over 6 in. . . . .	-	-	-	31,052	-	-	31,052
Total Crappie . . . .	29	-	-	31,652	-	-	31,681
Horned Pout:							
Under 6 in. . . . .	82,699	-	-	61,075	-	-	143,774
Over 6 in. . . . .	857	1,000	175	51,265	-	-	53,297
Over 12 in. . . . .	-	-	-	17,119	-	135	17,254
Total Horned Pout . .	83,556	1,000	175	129,459	-	135	214,325
Pickrel:							
Under 6 in. . . . .	238	-	-	1,638	-	-	1,876
Over 6 in. . . . .	80	-	-	5,217	-	-	5,297
Over 12 in. . . . .	-	-	-	927	-	90	1,017
Total Pickerel . . . .	318	-	-	7,782	-	90	8,190

(Continued)

	PRODUCT OF STATE HATCHERIES			NOT HATCHERY PRODUCTS (SEINED, PURCHASED, GIFT, ETC.)			Grand total
	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	Planted direct to public waters	Distributed to clubs for rearing to larger size before liber- ation	Distributed for study, exhibit, etc.	
Yellow Perch:							
Under 6 in. . . . .	173,244	—	100	13,500	—	—	186,844
Over 6 in. . . . .	—	1,000	—	71,160	—	315	72,475
Over 12 in. . . . .	—	—	—	1,015	—	—	1,015
Total Yellow Perch . . .	173,244	1,000	100	85,675	—	315	260,334
White Perch:							
Over 6 in. . . . .	—	—	—	191,470	—	18	191,488
Over 12 in. . . . .	—	—	—	7,435	—	—	7,435
Total White Perch . . .	—	—	—	198,905	—	18	198,923
Pike Perch:							
Fry . . . . .	—	—	—	500,000	—	—	500,000
Muskallonge:							
Fry . . . . .	—	—	—	20,000	—	—	20,000
Total Trout and Pond Fish:							
Fry . . . . .	109,000	—	350	520,000	—	—	629,350
1 inch and over . . . .	1,160,068	23,050	1,495	548,206	—	873	1,733,692

## GAME DISTRIBUTED FOR THE PERIOD DECEMBER 1, 1932 TO NOVEMBER 30, 1933

(This table does not show stock transferred from one game farm to another nor does it show additions to brood stock.)

	PRODUCT OF STATE GAME FARMS		NOT PRODUCT OF STATE GAME FARMS*		Total
	Liberated direct to covers	Wintered by clubs and others for liberation in spring of 1934	Liberated direct to covers	Wintered by clubs and others for liberation in spring of 1934	
Pheasants:					
Young . . . . .	16,507	2,939	3,106	184	22,736
Adult . . . . .	330	—	193	—	523
Quail:					
Young . . . . .	4,480	—	2,000	—	6,480
Adult . . . . .	1,439	—	50	—	1,489
Cotton-tail Rabbits:					
Adult . . . . .	382	—	1,267	—	1,649
White Hares:					
Adult . . . . .	—	—	5,251	—	5,251

\* Purchased, gift, trapped, etc.

## MARINE FISHERIES

The task of enforcing the laws relating to shellfish and to swimming salt water fish of all kinds, and the laws relating to the inspection of food fish, is now consolidated in the Bureau of Marine Fisheries, dating from May 24 when the State Inspector of Fish was appointed also to the position of State Supervisor of Marine Fisheries. This has proven an excellent move from the standpoint of economy and has greatly increased the effectiveness in both fields of activity, by avoiding duplication of effort, in organizing the work to better advantage, and in providing a uniform policy for all of the marine work of the Division.

Within the present year also a revision of the marine fisheries laws was effected by the enactment of Chapter 329, Acts of 1933, which inserted Chapter 129-A and Chapter 130 into the General Laws. These two chapters clarified and perfected the marine laws and transferred the enforcement of certain other laws from the State Department of Public Health to the Supervisor. This codification became effective on October 15.

In effecting this consolidation of two branches of the work there has been brought into the foreground the necessity for certain additions in personnel and equipment, to adequately discharge the responsibilities imposed by law on these offices. While some of these needs have been pointed out in previous reports, they have become more urgent due to the enlargement of the Supervisor's duties by the revision of the laws mentioned above.

The principal requirements are additional coastal wardens, deputy fish inspectors, and patrol boats. Accordingly, request was made in the Forecast for 1934 for sufficient funds to add four coastal wardens, four deputy fish inspectors and to purchase a patrol boat.

### ENFORCEMENT OF THE MARINE FISHERIES LAWS

#### *Personnel*

The Supervisor now has under his jurisdiction four deputy fish inspectors and nine coastal wardens. This force is far from adequate to perform the duties which are imposed on him.

For example, the deputy fish inspectors are distributed as follows: one at the Boston Fish Pier; one at Northern Avenue and Atlantic Avenue, also covering the shore district as far north as Lynn; and one at Gloucester, in charge of the inspection of the retail markets in Essex County. The entire remaining portion of the State must, therefore, be covered by the remaining inspector. In the portion of the State covered by this one inspector there are approximately 2,000 stores which handle fish either every day or on certain days of the week. It is evident that the inspections will be far from frequent; in fact, at the very most this inspector would be unable to visit the stores oftener than three times a year. It is plain that a check on these stores, made as infrequently as this, would be far from satisfactory.

A similar comment could be made on the work of the coastal warden force. It is physically impossible for the coastal wardens to satisfactorily check violations over a coast line of more than 2,000 miles, owing to the great amount of territory it would be necessary to cover, to say nothing of investigations made necessary in connection with the issuance of shellfish certificates and permits, referred to elsewhere.

#### *Inspection of Food Fish*

Fish inspection—the task of preventing fish that is unfit for food from being sold to the consuming public—is one of the most important features of the work of administering the marine fisheries laws. Handicapped as the Bureau is with a force of deputy inspectors so ridiculously small, it is impossible to make these inspections as frequently as is really necessary.

Not only must fish be inspected at the point of landing to be sure that it is in good condition when removed from the vessels, but it must be inspected when packed in wholesale houses, while being placed in cold storage, and also inspected frequently at the retail stores which sell directly to the public. In addition to this inspection of fish which is locally caught, the inspectors must constantly



watch all incoming steamers, vessels, railroad cars and trucks, to prevent the entrance of spoiled fish from other states or from foreign countries. In this way nine consignments of frozen swordfish were received from Japan, consisting of 336,671 pounds, of which amount 9,135 pounds were condemned by the deputy inspectors as jellied. Likewise 680,538 pounds of fresh and frozen swordfish were received from Nova Scotia, of which amount it was found necessary to condemn 79,876 pounds.

The results of the inspection of fish during the year may be seen from the following summary:

Total inspections . . . . .	25,453
Fish condemned:	
Japanese swordfish . . . . .	9,135
Canadian swordfish . . . . .	79,876
American swordfish . . . . .	18,892
Miscellaneous fish . . . . .	142,273
	<hr/>
	250,176
Lobsters condemned:	
Canadian subsidized lobsters . . . . .	52,367
Other Canadian lobsters . . . . .	88,184
American lobsters . . . . .	4,372
	<hr/>
	144,923

#### *Work of the Coastal Wardens*

The regular law enforcement personnel was supplemented by two inland fish and game wardens on the islands of Martha's Vineyard and Nantucket, and by twenty-six unpaid deputy coastal wardens. In the revision of the laws the wardens engaged in marine work are officially designated "Coastal Wardens."

Through economy in the past year the Bureau was enabled to add to its fleet of patrol boats a 35-foot power boat which has been badly needed in recent years. A 22-foot fisherman's boat, formerly used at Penikese Island Sanctuary, was transferred by the Director to the marine work. These, together with the motor boat "Wanderer," make available for patrol duty three first-class boats, but because of the extended coast line of the Commonwealth, which is divided by Cape Cod into two distinct sections and augmented by several large islands situated at some distance from the mainland, at least one more small motor boat is considered necessary.

Frequent emphasis has been laid, in previous reports, on the value of a boat patrol in the enforcement of the marine laws. Indeed, it is quite imperative. As an example of what this type of work may accomplish, it may be pointed out that on July 9 and 10 the "Wanderer" made a patrol of the State waters from Boston to Provincetown, for the purpose of inspecting fishermen, returning by way of Plymouth. On these two days the boat travelled more than 150 miles, and during the trip nine boats found dragging in restricted waters off Race Point and Wood End were boarded, a number of lobster boats were overhauled and inspected, and 27 men brought into court. Returning a few days later, it was found that the fleet of draggers had since the inspection kept well outside the restricted areas. Furthermore, on this trip information was gathered as to the abundance of mackerel in Cape Cod Bay, and on the activities of boats engaged in taking sea scallops. From June 1 to November 30, the "Wanderer" covered 2,362 miles in patrolling the coastal area of the State.

In addition to the normal work of law enforcement, another feature has entered into the picture, namely, the inspection necessary for the various shellfish certificates which it is mandatory on the Supervisor to issue. It is estimated there will be at least 7,000 of them issued from the Bureau in 1934. Before an application for any certificate is approved, an initial inspection must be made either by a deputy fish inspector or by a coastal warden, to see that the proper sanitary arrangements have been made, and after that, frequent inspections are called for to see that the holders of the certificates comply with the sanitary regulations. The present force will be unable to make all these inspections without neglecting the regular enforcement work to a very dangerous extent.

The district court work of the entire enforcement personnel was as follows:

## COURT CASES OF COSTAL WARDENS AND DEPUTY FISH INSPECTORS

	Total Cases	Discharged	Convicted	Jailed	Filed	Appealed	Fined	Total Fines Imposed
Taking clams from contaminated areas . . . . .	125	5	120	15	46	8	51	\$1,285.00
Possessing and transporting clams from contaminated areas . . . . .	5	-	5	-	1	-	4	150.00
Taking quahaugs from contaminated areas . . . . .	28	-	28	-	9	1	18	390.00
Taking scallops from contaminated areas . . . . .	1	-	1	-	-	-	1	20.00
Possessing undersized clams . . . . .	41	1	40	-	16	5	19	224.00
Possessing undersized quahaugs . . . . .	17	-	17	-	5	-	12	65.00
Possessing undersized scallops . . . . .	15	-	15	-	-	2	13	88.00
Taking scallops in close season . . . . .	5	-	5	-	-	-	5	40.00
Taking over one-half bushel quahaugs without permit . . . . .	3	-	3	-	-	-	3	15.00
Possessing short lobsters . . . . .	25	1	24	-	2	3	19	657.00
Lobster fishing without a license . . . . .	33	-	33	-	8	7	18	260.00
Crab fishing without a license . . . . .	7	-	7	-	6	-	1	10.00
Having in possession egg-bearing lobsters . . . . .	1	-	1	-	1	-	-	-
Interfering with other fishermen's gear . . . . .	5	-	5	-	3	2	-	50.00
Selling lobster meat without a permit . . . . .	2	-	2	-	1	-	1	10.00
Drawing lobster pots between sunset and sunrise . . . . .	1	-	1	-	1	-	-	-
Possessing punched lobsters . . . . .	2	1	1	-	1	-	-	-
Dragging in restricted areas . . . . .	50	8	42	-	13	3	26	745.00
Torching herring . . . . .	7	2	5	-	-	-	5	50.00
Taking herring in fishways . . . . .	4	-	4	-	4	-	-	-
Miscellaneous . . . . .	16	3	13	1	4	1	7	130.00
Keeping fish unfit for food with intent to sell . . . . .	3	-	3	-	-	-	3	65.00
Exposing for sale fish unfit for food . . . . .	16	1	15	-	5	-	10	235.00
	412	22	390	16	126	32	216	\$4,489.00

## SHELLFISH AND CRUSTACEA

Better control of the shellfish industry is promised by the requirement, in the revision of the marine fisheries laws, for the operation of the industry under a system of certificates issued to those who handle shellfish commercially. There are four forms of these certificates,—Bed Certificates and Dealers' Shellfish Certificates, for which there is no charge; Dealers' Shipping Certificates, fee \$10; and Diggers' Shipping Certificates, fee \$2. Certificate forms were printed and the system put into operation during the latter part of the year.

There has also been added to the duties of the Supervisor, under Section 75, Chapter 130, General Laws as amended, the task of determining whether or not shellfish in certain areas are of sufficient commercial value to warrant the construction and maintenance of a purification plant. Upon receipt of a petition requesting such determination filed by the aldermen of a city, or the selectmen of a town, or by ten percent of the registered voters, the Supervisor is required to hold a public hearing on the question. If, as a result of the hearing, he decides in the affirmative, he must then prescribe the location and plan of a purification plant, the sanitary aspect of which has been approved by the Department of Public Health. All bills for the erection and operation of such a plant, which are approved by him, are then annually apportioned among the cities or towns which contribute to the pollution. The ratio of responsibility for such pollution is prescribed by a Board of Commissioners appointed by the Supreme Judicial Court.

*Purification of Clams*

Under special permit from the Supervisor 33,258 bushels of clams were taken this year from contaminated areas and purified at chlorination plants located at Plymouth, Newburyport and Quincy. To obtain these clams a total of 4,008,095 square feet of flats were dug over by 379 men. The purification plants at Newburyport and Plymouth were operated throughout the entire year. At Newburyport 18,945 bushels of clams were treated, which were taken, for the most part, from the flats at Newburyport, Salisbury and Winthrop, although 1,830 bushels were received from areas in Quincy and Newbury. At Plymouth a total of 13,215 bushels were purified from areas near Quincy. The plant at Scituate



was operated for a few days in June and July, during which period 1,098 bushels of clams taken from local areas were treated.

During the late summer a new system of issuing permits to take shellfish from these contaminated areas was installed, and new rules adopted governing them. It is expected this system will provide a more satisfactory check on the operations of the diggers, and it has already facilitated the enforcement of the law and reduced the number of violations.

A renewed interest is being taken in the purification of clams since the revision of the laws, and it is expected that many more clams will be taken from the contaminated area in the coming year.

### *Permits*

Shellfish permits were issued to the number of 696, classified as follows: to take clams from contaminated areas for purification, 8 master diggers' permits and 389 diggers' permits; to take shellfish from contaminated areas for bait purposes, 210, and for transplanting seed shellfish, 9.

In order to conform with the new laws and to correct certain irregularities which had arisen in this comparatively new field, it was found necessary to thoroughly study and revise the permit and certificate systems. As a result, distinct improvements have been made which appear to fully justify the amount of time thus spent, although it resulted in a certain curtailment in other activities.

### *Starfish Extermination*

Sixteen months have passed since the effective date of the act providing for the extermination of starfish in the shellfish areas along the southern shore. It is pertinent to review what has been accomplished in this ambitious undertaking, especially as this is the first time anywhere that an attempt of such magnitude has been made against this relentless enemy of the shellfish, and perhaps also the first time that a drive of this kind has been directed against any enemy of the marine fisheries.

At this point it is well to repeat, that it never was hoped to entirely exterminate this pest, but merely to reduce its numbers to such an extent that the shellfish industry in the affected areas could again thrive and provide a source of livelihood to the thousands of citizens in the coastal areas along the southern shores of the State. It is doubtful if many persons, even among fishermen, realize the extent of the damage done by starfish even when its numbers may be considered more or less normal.

Protected by nature, which makes it nearly immune from natural enemies in its adult state, the starfish is extremely prolific—a medium sized adult producing several million eggs—and is well adapted for destroying shellfish from early larval stages throughout a rather long but indefinitely known period of life. Even a moderate number of adult starfish are capable of rapidly reducing the number of the un-imbedded shellfish, such as scallops, in any area, and when matted together may even smother out such hardy imbedded shellfish as quahaugs, feeding on them as rapidly as they are forced to the surface of the soil.

Assuming that a medium sized starfish will consume only one adult scallop every week, which is a ridiculously low average, a single starfish could in a year's time easily destroy practically one-half bushel of scallops. At this rate a bushel of medium sized starfish, which contains approximately 500 individuals, could destroy in a year 250 bushels of adult scallops and a much larger number of the seed. When therefore it is considered that in a single day in the town of Wareham 2,600 bushels of starfish were collected in the campaign of extermination, is there any wonder that the yield of scallops in that town fell from \$200,000 a year to less than \$1,000? A similar story could be told of the alarming destruction of the scallop industry by starfish in several other towns in the southern waters of Massachusetts.

To date, November 30, 1933, the State and towns, with splendid cooperation, have expended \$32,611.04 in removing starfish from the waters of eleven towns. The tremendous total of 109,776 bushels has been dredged and brought ashore, representing more than 55,000,000 individual starfish.

As an indication of how thoroughly the starfish have been dredged out of



certain areas, in one locality where in September of 1932, each boat was bringing in from 100 to 190 bushels daily and making good pay at 15c a bushel, the same fishermen in September of 1933 could not, at 50c per bushel, earn enough to pay expenses. So it became necessary to resort to day work in order to clean up the remaining small patches of starfish. Furthermore, seed scallops are showing up in all of these areas, and, with a return of a normal season, the scallops in those areas should be quickly restored to their usual abundance. The work is now being extended to other towns which at first were reluctant to start the work.

In addition to the actual accomplishment of removing this tremendous number of starfish, several other worthwhile results have been brought about. The fishermen and the townspeople have, by actual demonstration, been convinced of the seriousness of the starfish menace, and this educational feature will go far toward encouraging the towns to protect their shellfish areas against such occurrences in the future.

At the beginning of the work the Division required the towns to make a regulation that persons returning starfish to the water should forfeit their privilege of gathering shellfish. It is now proposed to make this a State law.

Then, too, with the failure of the scallop season and the general lack of employment caused by the depression, the money which was expended in dredging starfish and which was paid directly to the fishermen, prevented a great deal of hardship.

The balances of the two appropriations made by the State will be used in still further reducing the number of starfish in the affected areas and in protecting the beds of seed scallops which are appearing everywhere in those areas from which the starfish have been rather thoroughly removed. It is hoped that this can be continued until a normal scallop season occurs, and the towns can resume the burden of protecting their local shellfish areas. This balance will also provide for work in other towns which were at first quite hesitant in undertaking this work, but which are now seeing the advantages of coming under the provisions of the starfish act.

The following table shows the collection of starfish from the time the law became effective in July, 1932, until Nov. 30, 1933.

TOWN	Date Collections Began	EXPENDITURE		BUSHELS BOUGHT		Total Bushels by State and Town
		Town	State	From Town Funds	From State Funds	
Bourne . .	9/15/32	\$1,564.80	\$4,233.17	3,623	10,701½	14,324½
Dartmouth .	9/15/33	350.00	1,021.00	2,519	7,455	9,974
Edgartown .	12/31/32	701.00	1,430.00	2,706	5,720	8,426
Fairhaven . .	8/17/32	349.18	1,047.10	724½	2,302	3,026½
Marion . .	7/ 8/32	1,227.77	3,089.50	2,782	13,269	16,051
Mattapoisett .	9/26/32	1,496.25	4,269.30	2,509½	15,666	18,175½
New Bedford .	9/28/33	250.00	701.32	690	2,061	2,751
Oak Bluffs . .	3/31/33	50.00	2.50	40	5	45
Swansea . .	6/30/33	74.95	207.50	240	720	960
Tisbury . .	2/ 9/33	99.50	233.26	398	773	1,171
Wareham . .	6/ 8/32	2,799.27	7,413.67	11,086	23,785½	34,871½
Total . .	-	\$8,962.72	\$23,648.32	27,318	82,458	109,776

Total expenditure \$32,611.04. The total of 109,776 bushels represents approximately 55,000,000 individual starfish.

*Sea Crab Fishery*

Sixty-five crab licenses were issued for which the State received \$315.25 in fees. Reports were received from 48 fishermen, as follows: men, 48; number of boats, 43; value of boats, \$15,720; number of pots, 2,745; value of pots, \$7,260; total equipment value, \$23,178.75; number of crabs, 4,549,035; value of crabs, \$25,451.52.

*Lobster Fishery*

There were 1,001 lobster fishermen's licenses issued, for which a revenue of \$4,854.85 was obtained. A consolidated report on the catch of these fishermen is given in the accompanying table.

A total of 6,812 egg-bearing lobsters, weighing 17,465 pounds, caught along the shores of the Commonwealth, were purchased in 1933 at a cost of \$4,078.96. These lobsters were liberated along the entire coast line from Rockport to Westport, and in sheltered places off the islands of Nantucket and Martha's Vineyard. In addition to these, 25,753 egg-lobsters were caught and liberated by the fishermen on the fishing grounds, without cost to the State. From international shipments 4,220 egg-lobsters and 21,641 lobsters under legal length were seized and liberated by the coastal wardens.

*Lobster Fishery Statistics, 1933*

	Total	BY COUNTIES							
		Essex	Suffolk	Norfolk	Plymouth	Barnstable	Bristol	Nantucket	Dukes
Number of fishermen listed	954	293	60	49	233	131	71	12	105
Number of fishermen reporting . . .	915	325	55	48	219	112	68	12	76
Lobster Catch:									
Number . . . . .	1,360,876	553,388	106,351	72,319	341,321	70,536	65,836	4,169	146,956
Pounds . . . . .	1,439,224	468,395	116,594	99,897	420,635	59,691	84,392	6,602	183,018
Value . . . . .	\$334,425	\$116,201	\$22,528	\$20,922	\$94,421	\$29,446	\$14,506	\$1,350	\$35,051
Number of Egg Lobsters . . . . .	33,155	12,417	2,053	1,335	5,824	5,549	2,131	584	3,262
Lobster Pots:									
Number . . . . .	57,361	16,569	4,496	2,438	11,519	6,069	5,326	1,091	9,853
Value . . . . .	\$142,525	\$37,465	\$9,855	\$5,984	\$31,031	\$14,078	\$16,031	\$3,053	\$25,028
Boats:									
Number . . . . .	870	301	44	39	198	135	64	13	76
Value . . . . .	\$217,329	\$33,300	\$15,370	\$10,047	\$49,494	\$41,464	\$11,709	\$124	\$55,821
Other Equipment Value . . . . .	\$28,251	\$2,408	\$421	\$681	\$4,022	\$4,146	\$184	\$13,389	\$3,000
Total Equipment Value . . . . .	\$399,633	\$84,605	\$25,645	\$16,712	\$84,547	\$59,688	\$27,924	\$16,566	\$83,946



## SEA AND SHORE FISHERIES

Reports received from the shore net and pound fishermen as required by Section 24 of Chapter 130, General Laws, as amended, give the following data on the season of 1933: number of men engaged in the fishery, 290; number of boats, 138, valued at \$65,216; number of traps and weirs, 146, valued at \$178,884; total value of equipment, \$407,868; amount of fish caught, 18,456,545 pounds; value of fish, \$213,975.

*Port of Boston*

The total landing of fish at Boston by fishing vessels in 1933 exceeded that of the previous year by 6,820,711 pounds, and the value of this catch was greater by more than a million dollars. These figures might have been exceeded had not certain mackerel fishermen agreed to limit the catch of mackerel during the height of the season. Somewhat of uncertainty existed throughout the year, due to the efforts of the industry to formulate a code of fair competition under the National Recovery Act. No effective code has as yet been established.

The number of vessels engaged in the various branches of the fisheries that landed fish at Boston for the past five years, and the amount of fish landed by them, are given in the following tables:

NUMBER OF VESSELS LANDING FISH AT BOSTON FOR THE PAST FIVE YEARS

	1929	1930	1931	1932	1933
Dragners (large and small) . . . . .	198	202	182	185	164
Steamers . . . . .	60	69	62	48	63
Line vessels (hand liners and trawls) . . . . .	66	82	69	78	70
Swordfish . . . . .	76	87	67	56	64
Mackerel . . . . .	103	112	107	116	104
Halibut . . . . .	17	18	19	15	11
Total . . . . .	520	570	506	498	476

RECEIPTS OF FISH AT BOSTON DIRECT FROM THE FISHING FLEET FOR A PERIOD OF FIVE YEARS  
ENDING NOVEMBER 30, 1933

	1929 (Pounds)	1930 (Pounds)	1931 (Pounds)	1932 (Pounds)	1933 (Pounds)
Large Codfish . . . . .	23,576,163	23,834,885	24,441,043	20,439,384	27,391,340
Market Codfish . . . . .	15,786,557	26,499,149	25,620,020	25,997,822	31,478,555
Cod Scrod . . . . .	280,386	169,980	223,786	139,920	189,455
Haddock . . . . .	153,624,371	160,665,853	108,324,792	86,058,865	82,381,000
Scrod Haddock . . . . .	9,647,206	8,209,927	9,710,768	31,526,489	30,182,200
Hake . . . . .	10,567,876	13,764,080	6,304,425	4,170,806	4,905,060
Small Hake . . . . .	3,420	81,530	15,120	41,200	461,500
Pollock . . . . .	4,286,822	4,821,757	5,070,640	4,547,001	7,904,185
Cusk . . . . .	2,170,200	3,819,348	3,343,296	2,500,980	2,503,340
Halibut . . . . .	2,609,119	2,499,011	2,374,232	2,133,603	1,731,916
Mackerel . . . . .	21,232,279	23,606,198	19,908,792	25,144,121	17,554,665
Swordfish . . . . .	4,096,085	3,078,088	1,531,952	2,249,947	1,681,175
Miscellaneous . . . . .	11,675,599	14,297,200	11,954,828	8,289,133	11,695,591
Total . . . . .	259,556,083	285,347,006	218,823,694	213,239,271	220,059,982

*Port of Gloucester*

The following amounts of fresh fish were landed in Gloucester from Dec. 1, 1932, to November 30, 1933:

Large Cod . . . . .	5,545,560 lbs.
Market Cod . . . . .	1,266,238 "
Cod Scrod . . . . .	16,390 "
Haddock . . . . .	2,484,669 "
Scrod Haddock . . . . .	87,510 "
Hake . . . . .	490,452 "
Small Hake . . . . .	11,805 "
Pollock . . . . .	2,895,282 "
Cusk . . . . .	275,930 "
Halibut . . . . .	4,293 "
Mackerel . . . . .	4,271,997 "
Swordfish . . . . .	771 "
Miscellaneous . . . . .	782,369 "
<hr/>	
Total pounds . . . . .	18,133,266
Valued at \$358,207	

ESTIMATED VALUE OF FISHERY PRODUCTS OF MASSACHUSETTS  
(DEC. 1, 1932, to Nov. 30, 1933)

Vessel landings at port of Boston . . . . .	\$6,614,000
Vessel landings at port of Gloucester . . . . .	360,000
Vessel landings at ports of New Bedford and Woods Hole . . . . .	615,000
Shipped direct to New York . . . . .	600,000
*Shore net and pound fishery . . . . .	213,975
*Lobster fishery . . . . .	334,425
Soft shell clam fishery . . . . .	980,000
Quahaug fishery . . . . .	450,000
Shallow water scallop fishery . . . . .	320,000
Sea scallop fishery . . . . .	170,000
Oyster fishery . . . . .	176,000
Razor clam fishery . . . . .	20,000
Sea crab fishery . . . . .	92,500
Bait worm fishery . . . . .	81,000
Sea moss fishery . . . . .	3,000
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Total estimate of Massachusetts fisheries . . . . .	\$11,029,900

\*Compiled from reports of fishermen.

*Restoration of Shad Fishing in Palmer River*

From Colonial days the protection of the shad fishery in Palmer River has been considered as very desirable. As early as 1786, an act was passed designed to protect the shad in this stream. Whatever temporary effect early laws may have had in conserving the shad in this river, they were not completely satisfactory, as is indicated by a complexity of later laws which sought to modify them. However, at the present time the Palmer River is about the only stream of consequence in this State in which a shad fishery is annually conducted, although instead of producing shad to the value of more than \$50,000 a year as in the past, the output has shrunk to an estimated \$10,000.

The situation in regard to the protection of this fishery is complicated by the fact that the lower and wider part of the river is in Rhode Island and the spawning grounds in Massachusetts. There are valuable fishing grounds in both states. In Rhode Island the fish are taken by traps, the leaders of which stretch nearly across the stream leaving a small open passage in the channel of the stream as required by the laws of Rhode Island. Three of these traps were operated in 1933. In Massachusetts the town of Rehoboth annually sells the

seining privilege for a selected area in the river where very choice fish are taken. In the town of Swansea there is an area where formerly many shad were seined, but in recent years the town has not sold this privilege.

For many years a controversy has sporadically broken out between the states as to their respective responsibility in the depletion of this fishery, although it matters little in the final analysis in which state the fish are caught so long as they continue to reach market before they have had an opportunity to spawn.

This year, through the efforts of the Bureau of Marine Fisheries, in the absence of joint protective laws between the states, an agreement was made between the Director of the Division of Fisheries and Game, the holder of the fishing privilege in Rehoboth, and the operators of fish traps in Rhode Island. This agreement provides for the removal of all traps and seines and a discontinuance of fishing after June 1. The fish at this time of year are full of very ripe spawn. Furthermore, the holder of the seining privilege in Rehoboth voluntarily gave up fishing in a portion of the stream—about one-eighth of a mile in length—which is a natural spawning ground. This area was posted and policed, and the fishway repaired by the Bureau. Later on, at the height of the spawning season, forty-eight large, spawn-filled shad were caught and released above the dam at Shad Factory as the fishway at this place did not work quite satisfactorily. The fishery officers and interested fishermen of both states cooperated splendidly in this work. A few fish were injured in the capture and subsequent transference, but most of them survived the ordeal and some were reported to have been seen the following day at a point about one mile above the dam. The principal features of this agreement should be enacted into law, as it is a plan which gives great promise for the future of the shad fishery in this river.

#### *Bounty on Seals*

In the revision of the marine fisheries laws effective Oct. 15, the bounty on seals was increased from \$2 to \$5 for each seal delivered to the town treasurer in accord with the provisions of Section 85 of Chapter 130 of the General Laws as amended. During the fiscal year the following towns were reimbursed by the Commonwealth (through the county treasurers) for bounties of \$2 each on 202 seals and \$5 each on 9 seals: Barnstable, \$4; Beverly, \$4; Chatham, \$4; Cohasset, \$2; Danvers, \$2; Duxbury, \$2; Eastham, \$2; Essex, \$44; Gloucester, \$10; Ipswich, \$75; Kingston, \$46; Hingham, \$14; Lynn, \$2; Orleans, \$5; Plymouth, \$4; Provincetown, \$9; Quincy, \$16; Revere, \$16; Rockport, \$12; Salem, \$2; Weymouth, \$12; Yarmouth, \$162. Fees to city and town treasurers, \$105.50. Total, \$554.50.

#### **NOTE OF APPRECIATION**

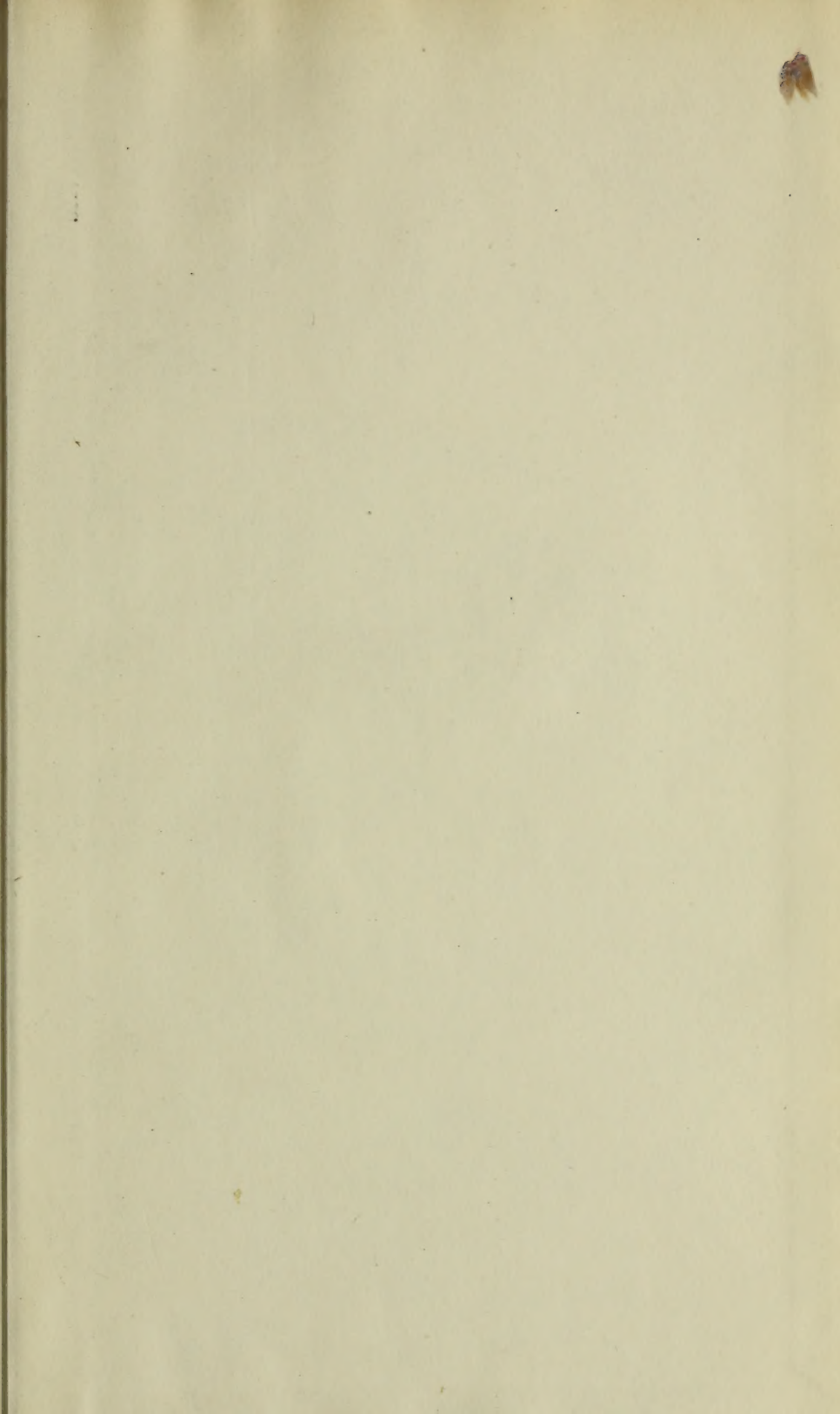
It would not be proper to bring this report to a conclusion without a word of appreciation for the faithful and efficient work performed by the men and women making up the personnel of the Division. Despite a reduction of their personal incomes they performed their respective tasks with their usual faithfulness and with increased efficiency. Notwithstanding a marked reduction in the funds of every branch of the Division, those in charge of the various units went forward with a determination not merely to maintain the record of the past, but to surpass the accomplishments of previous years. Their success in this connection has already been inscribed in the preceding pages of the report. The Director desires to give to the personnel full credit for the attainments and progress of the Division during the past year.

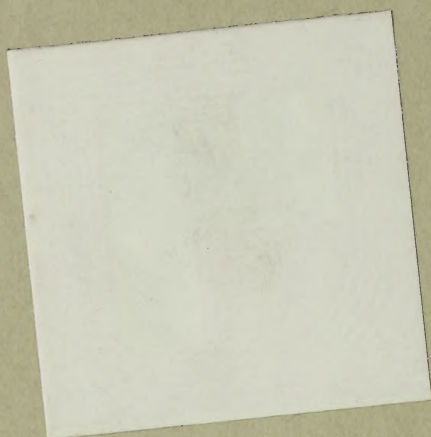
Respectfully submitted,

RAYMOND J. KENNEY,

*Director, Division of Fisheries and Game.*







DEC 7 1936

